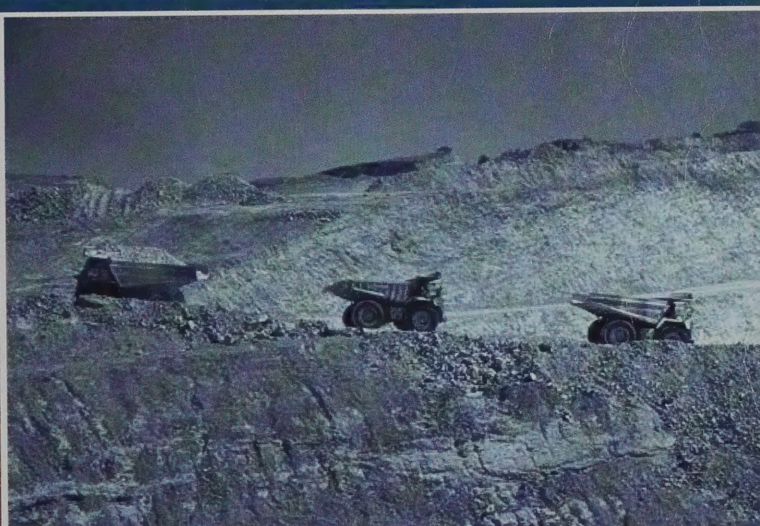
DRAFT

ENVIRONMENTAL IMPACT STATEMENT
GENESIS PROJECT
NEWMONT MINING CORPORATION



February 2010

BLM

Elko District Office - Nevada

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Elko District Office
3900 East Idaho Street
Elko, Nevada 89801
http://www.nv.blm.gov

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In Reply Refer To:
3809 (NV-013)
NVN-070712

Dear Reader:

Enclosed for your review and comment is the Genesis Project Draft Environmental Impact Statement (EIS) prepared by the Bureau of Land Management (BLM), Elko District Office. The EIS analyzes the direct, indirect, and cumulative impacts associated with the proposed extended mining activities at Newmont Mining Corporation's Genesis-Bluestar Operations Area in Eureka County, Nevada.

Comments should be postmarked or otherwise delivered to the Elko District Office within 45 days after publication of the Notice of Availability for this Draft EIS in the Federal Register to ensure full consideration. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment - including your personal identifying information in your comment – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public view, we cannot guarantee that we will be able to do so. Comments on the EIS can be sent to the above address, Attn: Kirk Laird or by fax to (775) 753-0255 or to email at Kirk_Laird@nv.blm.gov or eiscommentselko@nv.blm.gov.

A Final Environmental Impact Statement will be prepared that will consider the comments received during the public review and comment period. If you would like any additional information, please contact Kirk Laird at (775) 753-0272.

Sincerely,

Kenneth E. Miller
District Manager

DRAFT
ENVIRONMENTAL IMPACT STATEMENT
NEWMONT MINING CORPORATION
GENESIS PROJECT

LEAD AGENCY:	U.S. Department of the Interior Bureau of Land Management Elko District Office Elko, Nevada
COOPERATING AGENCIES:	Nevada Department of Wildlife Elko County
PROJECT LOCATION:	Eureka County, Nevada
COMMENTS ON THIS DRAFT EIS SHOULD BE DIRECTED TO:	Kirk Laird, EIS Project Manager Bureau of Land Management Elko District Office 3900 East Idaho Street Elko, NV 89801 (775) 753-0200
DATE BY WHICH COMMENTS MUST BE POSTMARKED TO BLM:	TBD

ABSTRACT

This Draft Environmental Impact Statement (DEIS) analyzes potential impacts associated with Newmont Mining Corporation's proposal (the Genesis Project) to amend the Genesis-Bluestar Plan of Operations (NVN-70712). The Genesis Project, submitted in November 2007, includes development and operation of open pit mines and associated support facilities located within the previously permitted boundary for the Genesis-Bluestar Operations Area, which is located approximately 20 miles north of Carlin, Nevada. The Genesis Project proposes expansion of existing mine pits and development of the Bluestar Ridge open pit mine, in-pit backfill of the Beast and Bluestar pits, partial backfill of the Genesis pit, vertical expansion of the Section 5 and Section 36 Waste Rock Disposal facilities, reclamation of surface disturbances in the Genesis Project area, and extension of employment for twelve years. Under the Proposed Action approximately 43 acres of new disturbance would occur within the previously permitted Genesis-Bluestar Operations Area. The Genesis Project would have a twelve-year operational mine life and produce approximately 60 million tons of ore and 450 million tons of waste rock. Closure activities may continue for a period of up to 30 years after mining activity is completed.

Responsible Official for DEIS: ______________________________

Kenneth E. Miller
District Manager
Elko District Office

SUMMARY

The Elko District Office of the United States Department of the Interior Bureau of Land Management (BLM) received a revised Plan of Operations (the Genesis Project or Project) from Newmont Mining Corporation (Newmont) in November 2007, proposing an amendment to the Genesis-Bluestar Operations Area (NVN-70712). The Genesis Project includes expansion and development of open pit mines and associated support facilities located within the previously permitted boundary for the Genesis-Bluestar Operations area. The Genesis Project is located on public and private land in Eureka County, Nevada, approximately 20 miles north of Carlin, Nevada.

This Environmental Impact Statement (EIS) describes Newmont's Proposed Action, No Action Alternative, and environmental consequences that could result from implementation of these actions. Potential direct, indirect, and cumulative effects on the environment are analyzed in this EIS. Impacts described herein will form the basis for a BLM decision regarding the Proposed Action, No Action Alternative, and selection of appropriate mitigation measures.

PROPOSED ACTION

Implementation of Newmont's Proposed Action would include the following:

- Expansion of the existing Genesis open pit mine, disturbing 43 new acres, and reworking existing mine disturbances for a total of approximately 1,135 acres;
- Development and operation of the Bluestar Ridge open pit mine and construction of an associated haul and access road;
- Placement of waste rock generated from expansion of the Genesis Mine as in-pit backfill in the previously depleted Bluestar and Beast pits, and mined out portions of the Genesis pit;
- Installation of drain boreholes and pumping wells to dewater the Genesis east highwall;
- Vertical expansion of the Section 36 Waste Rock Disposal Facility and construction of an associated haul and access road;
- Vertical expansion of the Section 5 Waste Rock Disposal Facility;
- Classification and management of potentially acid-generating (PAG) rock, including additional testing and plans for modified classification and management, if necessary;
- Extension of mining employment (no additional employment) in the local area; and
- Revegetation of approximately 985 acres disturbed by mining and related activities (about 150 acres would remain as open pit and highwall) in the Genesis Project area.

With the exception of the proposed Bluestar Ridge Mine pit, all proposed activities described above would occur on approximately 1,100 acres within the Genesis-Bluestar Operations Area.

New surface disturbance associated with the Proposed Action includes 26 acres for the Bluestar Ridge Mine pit, nine acres to accommodate placement of waste rock as in-pit backfill of the depleted Bluestar and Beast Mine pits, and eight acres of access and haul roads (43 acres total). For the purposes of this EIS, the new surface disturbance (43 acres) includes seven acres of exploration roads and drill pads constructed under previous authorization in the proposed Bluestar Ridge Pit area.

The Proposed Action would modify the existing approved reclamation and closure plan to allow backfill of mined-out pits. Waste rock generated during expansion of the Genesis Pit would be used to completely backfill the Bluestar, Beast, and partially backfill the Genesis Pit, reducing the area that would have remained as open pits under the No Action Alternative by approximately 300 acres.

Approximately 450 million tons (Mt) of waste rock would be removed to extract 60Mt of ore over a twelve-year operational life. Approximately 48.3Mt of oxide leach ore would be placed on the existing North Area Leach Facility and 11.7Mt of mill and refractory ore would be hauled to Mill 5/6 in the South Operations Area.

A Waste Rock Management Plan describing the methods, procedures, design, monitoring, and reporting that Newmont would use in managing waste rock associated with proposed mine expansion of the Genesis Project has been submitted to the Nevada Division of Environmental Protection (NDEP) as an amendment to its Water Pollution Control Permit (WPCP NEV0087065). In addition, Newmont, BLM, and NDEP developed an Adaptive Management Plan (AMP) for Waste Rock to confirm predicted waste rock behavior associated with development of the proposed Genesis Project. The AMP identifies ongoing waste rock characterization work, future waste rock monitoring associated with the Project, and actions that could be employed to manage PAG waste rock should a revised method or increased capacity of the proposed plan be warranted.

Expansion of the Genesis Pit would require dewatering that part of the Genesis Pit lying east of the Gen Fault, a north-south trending fault structure that spans the eastern portion of the Genesis Pit. The portion of the pit west of the Gen Fault lies within the groundwater drawdown area associated with ongoing dewatering activities at Barrick's nearby Goldstrike Operations (Betze Pit and Meikle Underground Mine) and Newmont's Leeville Mine and would not require dewatering. Current dewatering has lowered the regional groundwater table on the west side of the Gen Fault to a level where additional dewatering to accommodate Genesis Pit expansion is not necessary.

Variations in water levels separated by the Gen Fault are indicative of compartmentalization of groundwater in the Genesis Pit east highwall. Dewatering the east wall would involve construction of drain boreholes and pumping wells. Currently, up to 35 drains and ten wells, combining to pump up to 250 gallons per minute (gpm) for up to ten years, are expected to be necessary to dewater the Genesis Pit east highwall to allow the east highwall to be safely laid back. The number of wells and drains may be modified as dewatering experience is gained.

Water produced from pumping on the east side of the Gen Fault would be distributed through existing buried pipelines to Newmont's North Area Leach operations, Barrick's processing facilities, and to the Deep Post/Deep Star underground mining operation. Water produced via drains would infiltrate into permeable, dewatered carbonate rock beneath the Genesis Pit. All dewatering operations require permitting by the State of Nevada.

Continued development of the Genesis Project would require excavation and placement of approximately 450Mt of waste rock. Nearly 80 percent (355Mt) of waste rock generated over the life-of-mine would be used to backfill the Beast, Bluestar, and portions of the Genesis pits. Approximately 95Mt of waste rock would be placed as lifts on top of the existing Section 5 (41Mt) and Section 36 (54Mt) Waste Rock Disposal facilities.

PAG waste rock at Genesis is expected to total approximately 28Mt or six percent of total waste rock to be removed during mining. Waste rock with a Net Carbonate Value (NCV) less than zero and any waste rock with a paste pH of less than 6 is classified as PAG. Conversely, waste rock with an NCV greater than or equal to zero and with a paste pH of 6 or higher is classified as non-PAG. PAG waste rock would be segregated and placed in mined-out portions of mine pits (above pre-mining groundwater levels) and in the Section 5 and Section 36 Waste Rock Disposal facilities, and encapsulated with a minimum ten-foot thick layer of non-PAG acid-neutralizing waste rock.

To check existing results from waste rock classification analyses for the Proposed Action, a supplemental testing program would be initiated. If results from supplemental testing differ from existing analyses, classification and management of waste rock (up to an additional 100Mt of PAG) mined under the Proposed Action (up to 128Mt) may be modified as determined by the BLM and the NDEP using the guidance established in an AMP created specifically for this Project and included as part of the Waste Rock Management Plan for the Genesis Project.

Surface water control structures (e.g., berms and ditches) would be constructed as appropriate to preclude meteoric water from flowing into the proposed Bluestar Ridge Pit. These control structures would remain in-place over the operational life of the Project and as permanent features after final reclamation and mine closure. Sediment control measures have been implemented, as necessary to reduce soil movement within the site and to minimize off-site effects. These structures are designed and constructed to allow access for maintenance throughout the life of the Project. Soil collected in these structures would be periodically removed and placed in the soil stockpile or on reclaimed areas. Sediment control structures would be removed once vegetation has stabilized on reclaimed areas.

Existing ancillary facilities in the North Operations Area complex (e.g., maintenance shops, fueling areas) would be used to support mining activities at the Genesis Project. No new ancillary facilities would be needed to serve the Proposed Action.

All non-hazardous solid waste generated at the Genesis Project would be disposed in an existing NDEP approved Class III waivered landfill located in the Genesis-Bluestar Operations Area. Hazardous wastes would not be generated at the proposed Genesis Project. Wastes associated with ore processing would be administered under either the North Operations Area - a Conditional Exempt Small Quantity Generator of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) (40 CFR Part 260-270), or the South Operations Area, which is a Large Quantity Generator of hazardous waste as defined by RCRA.

Reclamation would include:

- Regrading waste rock disposal facilities, haul roads, and stockpile areas;
- Drainage control to channel run-off away from open pits and to minimize erosion;
- Replacing more than 622,000 cubic yards (cy) of salvaged growth media;
- Hauling approximately 3.0 million cubic yards (Mcy) of Tertiary Carlin Formation material from the East Lantern Waste Rock Disposal Facility (about one-half mile south of the Genesis Project) for use as growth media;
- Revegetation; and
- Monitoring of reclamation and water control structures.

The reclamation schedule includes concurrent reclamation during operations and post-mining recontouring and revegetation totaling approximately 985 acres. Approximately 150 acres would remain as highwall and open pit. The Genesis Project includes approximately 300 acres of additional reclamation compared to the No Action Alternative as a result of backfilling and reclamation of existing pits within the mining area.

PROJECT ALTERNATIVES

To this point, neither the BLM, nor any cooperating agency nor any commenting public has identified a reasonable alternative which would reduce or eliminate impacts resulting from implementation of the Proposed Action. Therefore, the only alternative discussed in detail in this EIS is the No Action Alternative. Five other alternatives were considered but eliminated from detailed analysis as discussed in Section 2.4. If an alternative is proposed, which is feasible, reasonable, and addresses a substantive impact, BLM will analyze that alternative.

NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be approved. Newmont would not receive authorization to use public land to conduct additional mining in the Genesis-Bluestar Operations Area as proposed by the Genesis Project amendment. Current operations could continue until the limits of existing authorizations are reached. A pit lake would develop in the Genesis Pit over the next 400 years, approximately 685 disturbed acres would be reclaimed (300 acres less than the Proposed Action). Newmont would reduce Carlin work force employment levels by 211 in 2010 with reductions in employment levels reaching 1,164 in 2016 compared to the Proposed Action.

Newmont would have the option of submitting a revised Plan of Operations (POO) for the Genesis Project addressing those issues that resulted in selection of the No Action Alternative. The revised POO would be reviewed for conformance to statutes and regulations and a new National Environmental Policy Act (NEPA) analysis would be completed where appropriate.

MAJOR ISSUES

Major issues identified by the agencies during review of the Genesis Project Plan of Operations Amendment and during public scoping include the following and are addressed in respective sections of the EIS:

- Social and economic impacts to the local and regional economy from labor income, tax revenues, and continued employment resulting from the Proposed Action;
- Potential impacts of dewatering compartmentalized groundwater east of the Gen Fault on the regional water system; and
- Classification and management of potentially acid-generating (PAG) rock.

IMPACTS

The following is a summary of potential impacts, by resource, resulting from the Proposed Action and No Action Alternative. Mining activities under the Proposed Action would occur over a twelve-year period from 2010 to 2021, with reclamation activities occurring both concurrently and continuing after mining ceases. Under the No Action Alternative, mining operations are expected to cease in 2010 followed by reclamation.

AIR QUALITY

Proposed Action

Gaseous criteria air pollutant emissions such as sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and carbon monoxide (CO) typically result from combustion related activities from diesel engines used to power mining equipment and haul trucks. Ambient monitoring of gaseous emissions at the Genesis Project is not required under permits issued by the Nevada Division of Air Pollution Control. Operations at the Genesis Project would be conducted under existing Air Quality Permit No. AP 1041-0402.02.

Mining would continue in open pits with fugitive dust emissions controlled at the point of generation. Ore and waste rock would be drilled and blasted in sequential benches to facilitate loading and hauling. Haul trucks enter and leave the pit traveling on main haul roads to the waste rock disposal facilities, pit backfill areas, Mill 5/6 complex in the South Operations Area, or the North Area Leach Facility.

Fugitive dust emissions would be generated from wind erosion of disturbed areas and road dust. All haul roads would be maintained on a continuous basis for safe and efficient haulage and to minimize fugitive dust emissions. Generation of fugitive dust from ore handling activities would be controlled using Best Management Practices (BMPs), which could include direct water application, use of approved chemical binders or wetting agents, water spray, and revegetation of disturbed areas concurrent with operations.

On July 18, 1997, EPA promulgated a revised National Ambient Air Quality Standard (NAAQS) for $PM_{2.5}$. The effective date of this rule is November 21, 2008 which requires states to complete a State Implementation Plan to implement $PM_{2.5}$ rules. The State of Nevada has submitted a plan to comply with the 1997 ($PM_{2.5}$) NAAQS, but as of the date of this document the EPA has not acted on the plan. The Genesis Project is located within an area classified by NDEP as an Attainment Area indicating air pollution levels in the area do not exceed ambient standards.

Approximately 4Mt of run-of-mine oxide ore associated with the Genesis Project would be placed annually on Newmont's North Area Leach Facility (a total of 48Mt over the twelve-year life-of-mine). Based on the average mercury content of Genesis ore (4.8 parts per million or ppm), a small amount of mercury would load to the carbon columns during the leaching circuit each year of operation. The impregnated carbon would be shipped to the Mill 5/6 complex for stripping and recovery of gold, silver, and mercury. The carbon regeneration procedure also results in recovery of mercury.

Approximately 6.7Mt of refractory ore from the Genesis Project would be shipped to the South Operations Area Mill 6 for roasting. Refractory ore would be mined and processed during an eight year period within the twelve-year Project life (837,500 tons annually). Based on the average mercury content of Genesis ore, approximately 8,040 lbs. of mercury would be associated with the refractory ore shipped to Mill 6 for processing.

Emission factors based on 2008 source testing for Newmont's South Operations Area indicates that 99.89 percent of the mercury present in the ore is retained or removed through emission controls at the roaster and carbon regeneration. As a result, the average annual mercury emissions from 46,440 pounds of available mercury (38,400 lbs associated with leach ore and 8,040 lbs associated with refractory ore) would be 51.2 lbs. Given that the mercury content of Genesis Project ore is low (4.8 ppm) compared with other ore sources, when combined with control technology, processing Genesis refractory ore as a batch or blended with other ore would not increase annual mercury emissions from the Mill 5/6 facility, but would extend the period of emissions and increase the total amount of mercury emitted from Mill 5/6.

No Action Alternative

The No Action Alternative would avoid emissions resulting from twelve years of mining activity, including removal and placement of 450Mt of waste rock and processing of 60Mt of ore. Emissions associated with currently authorized mining activities and reclamation would continue until completion, approximately 2010 for mining and approximately 2015 for major reclamation activities.

GEOLOGY AND MINERALS

Proposed Action

Approximately 450Mt of waste rock would be mined and placed in either the Section 36 or Section 5 Waste Rock Disposal facilities or backfilled into existing pits. Approximately 60Mt tons of ore would be mined and processed, of which 48Mt would be placed on the North Area Leach Facility and 12Mt processed at the Mill 5/6 facility in the South Operations Area.

The excavation and exposure of waste rock and ore to oxygen and precipitation during mining operations and thereafter, could result in formation of acidic water where sulfide minerals, and to a lesser extent sulfate minerals, exist within the rock. Such reactions could result in leaching of metals from the waste rock and contamination of both surface water and groundwater. However, geochemical modeling of the proposed encapsulated PAG rock has concluded that no meteoric water or groundwater would contact PAG rock, thus preventing the geochemical reactions that produce water contamination or acid rock drainage. PAG material exposed in pit highwalls would be covered by in-pit backfill.

In response to concerns from the Environmental Protection Agency (EPA), Newmont, BLM, and NDEP developed an AMP to provide additional testing of waste rock to determine if previous testing results were accurate. The AMP identifies additional waste rock characterization work, future waste rock monitoring associated with the Project, and actions that would be employed to manage additional PAG waste rock should a revised waste rock classification system, resulting in additional PAG tonnage, be warranted.

Supplemental rock characterization and confirmation testing associated with the AMP would be completed within the first year of the Genesis Project. Should results of the testing indicate the necessity of implementing a revised PAG management method, Newmont would initiate the requisite engineering design. Fundamentally, the revised PAG management method would involve expansion of the proposed PAG cells and possible additional PAG cells, depending on the tonnage involved. The complete AMP is included as Appendix A.

After completion of supplemental waste rock testing, waste rock monitoring would revert to the Genesis Project Waste Rock Management Plan, which is a component of Newmont's North Area Leach Operations Water Pollution Control Permit. The Waste Rock Management Plan would be continued throughout the life of the mine once the AMP is completed.

No Action Alternative

Implementation of the No Action Alternative would result in completion of mining under current authorizations and closure plans and avoid any additional impacts to public land. It would also eliminate recovery of approximately 60Mt of ore from the geologic resource, and the gold reserve intended to be mined would remain in-place. Pit backfill associated with the Proposed Action would not occur resulting in about 450 acres remaining as open pits and leaving access to whatever resources exist in those pits. The recovery of the pit lake would then eventually reduce access to those resources, increasing costs for future mining and thereby make it increasingly unlikely that the resources could be mined in the future.

WATER QUANTITY AND QUALITY

Proposed Action

Surface Water

The Proposed Action would not result in a modification of surface water conditions in the Project area because no natural undisturbed drainages currently exist within the footprint of the Proposed Action. Runoff from precipitation in the Project area would be collected in ditches and diverted to sediment ponds, with final use for mining-related activities. Ditches upgradient from disturbed areas would also be used to divert runoff from undisturbed areas around the mine site. Sediment control structures would remain active during the post-closure period until reclamation is complete.

The Genesis Pit would be backfilled with waste rock to a level above the predicted final post-mine recovered groundwater level. Therefore, no pit lake would form under the Proposed Action. The Bluestar and Beast pits would also be backfilled with waste rock. The Bluestar Ridge Pit would be above the final recovered groundwater level. Some ponding of water could be expected in the bottom of the Bluestar Ridge and the remnant Genesis pits in response to rain events or snowmelt run-off. PAG rock would not be encountered in the Bluestar Ridge Pit.

Groundwater

The proposed dewatering program for the Genesis Pit, required to safely expand mining operations, would result in lowering the water table in siliceous Vinini Formation rocks along the east side of the Gen Fault. This groundwater is not in direct communication with the regional groundwater system in the carbonates, which is currently being dewatered by operations at Barrick's Goldstrike Operations and Newmont's Leeville Mine. Thus the dewatering would not affect the regional groundwater system. The use of boreholes to permit groundwater from the Vinini to drain directly into the carbonates below is not expected to adversely impact groundwater quantity or quality. The amount of water drained would be small relative to the regional groundwater system as to have no measurable impact on quantity. Plugging the boreholes as required by Nevada state regulations after dewatering operations cease would reinstate the current groundwater situation of no or minimal communication between groundwater in the Vinini and the regional carbonate groundwater system.

Groundwater in the Vinini Formation east of the Gen Fault does not supply water to any seeps, springs, streams, or wells in the Project area. Dewatering for the Genesis Pit expansion would have no effect on surface water features or water rights.

Results of the updated Carlin Trend groundwater flow model show that the additional groundwater pumping and dewatering in the Vinini Formation east of the Genesis Pit would not measurably change the ten-foot drawdown isopleths for regional dewatering from current model predictions. During recovery of the regional groundwater level in the carbonates after cessation of mine dewatering in the northern Carlin Trend, groundwater would eventually rise into the backfilled Genesis Pit and contact waste rock. After recovery of water levels in the northern Carlin Trend is complete by about 2400, groundwater in the Genesis area is predicted to flow northward toward the nearby Betze/Post pit lake, which will begin to develop around 2030. All other mine pits at the Genesis Project site would be completed above the final recovered groundwater level. Backfilling would prevent development of a pit lake that would occur under the No Action Alternative.

Geochemical modeling of groundwater in the backfilled Genesis Pit and beneath waste rock disposal facilities predicts that groundwater would not become acidic as a result of the Genesis Project. PAG waste rock would be placed in encapsulation cells located above the expected recovery groundwater level in waste rock disposal facilities, including backfilled portions of the Genesis Pit. As the water table rebounds in the backfilled Genesis Pit, constituents in the waste rock released/dissolved during initial saturation would be relatively concentrated compared to groundwater beyond the confines of the Genesis Pit. Release of constituents to groundwater would steadily decrease over time and water quality would return to pre-mining water quality conditions due to dilution and attenuation by the large volume of carbonate rocks in the backfill and surrounding the backfilled pit. Because this groundwater would be isolated from the surface, it would not be the source for seeps or springs, nor would it be pumped for any purpose. The temporary concentration of constituents is not considered to be an impact of concern.

No Action Alternative

Surface Water

Effects to surface water resources for the No Action Alternative would be similar to the Proposed Action described above, except that the existing mine pits would not be backfilled and the Bluestar Ridge Pit would not be constructed. The possibility of ephemeral ponding of acidic water in the existing pits would continue and could require preventive/remedial treatment which would consist of placing limestone rock in the areas where such water was ponding as the limestone would neutralize any acidity. Approximately 450 acres of open pits (Bluestar, Beast, and Genesis) would remain and collect runoff which would be subject to infiltration and evapotranspiration.

A pit lake having a surface area of about 41 acres would form in the Genesis Pit to an elevation of about 5250 feet above mean sea level (amsl) as a result of the recovered water table in carbonate rocks. This lake would have no outlet to surface water, but would be subject to water loss through evaporation and limited groundwater flow northward toward the Betze Pit lake. Elevated levels of some metals above drinking water standards are predicted for final pit lake water quality.

If the No Action Alternative is selected, a review of the pit lake water chemistry would be completed and a possible Ecological Risk Assessment developed. Many wildlife and plant species have high tolerance for elevated toxin levels, but the areas of future concentration of pit lakes may introduce wildlife populations to sustained exposure to toxic components.

Groundwater

Potential impacts to groundwater quality would be similar to those described above for the Proposed Action with respect to potential for generating acid and releasing metals to groundwater. For the No Action Alternative, the acidity and release of constituents would result primarily from precipitation interacting with PAG material in pit walls rather than interaction between rebounding groundwater and backfilled waste rock.

The Genesis Pit lake is not expected to begin forming from the rebounding regional water table until about 2130. When groundwater levels reach equilibrium at an elevation of 5225 feet amsl, the regional groundwater flow system will flow from the Genesis area north toward the Betze/Post Mine area. The amount of groundwater flow from the Genesis Pit to the regional groundwater flow system is predicted to be low (one to two gpm). Model predictions show that 90 percent of the pit lake infilling would be completed by 2350. As the pit lake develops, evapoconcentration would result in a long-term increase of concentrations of some constituents. Precipitation of some solutes would occur with resulting decreasing concentrations. Overall, the pit lake is predicted to be alkaline with some metals (i.e., arsenic, beryllium, antimony, selenium, and thallium) predicted to exceed drinking water standards. Pit lake water would affect groundwater quality by increasing the concentration of constituents to slightly above that of pre-mining concentrations. This effect would be limited to the area immediately north of the pit lake, in the direction of groundwater flow. Limited flow (one to two gpm), combined with dilution from mixing with other groundwater, would reduce concentration levels to slightly greater than pre-mining concentrations.

SOIL RESOURCES

Proposed Action

The proposed Genesis Project would result in 43 acres of new disturbance. Impacts to soil occur in two separate stages during mining operations: 1) soil loss during salvaging, when growth media is stockpiled and stabilized in stockpile areas, and 2) loss between final redistribution and completion of reclamation. Most impacts to soil would occur during salvage and stockpile operations. Erosion during and after redistribution of growth media would have a greater effect on final reclamation.

Impacts to soil would include modification of chemical and physical characteristics, loss of soil to wind and water erosion, and decreased biological activity. Chemical changes would result from mixing surface soil with subsoil during salvaging operations. Impacts on physical characteristics of soil during salvage, stockpiling, and redistribution would include mixing, compaction, and pulverization from equipment and traffic. Soil mixing would reduce organic material and increase coarse fragments in the surface soil.

Water erosion could occur during heavy precipitation or run-off events due to exposed soil, fine soil texture, soil surface conditions, and slope. Newmont would continue to maintain the existing sediment control system (run-off control ditches and sediment ponds) to capture soil and sediment that moves from the disturbed area during precipitation events over the life of the Project. Once vegetation is established and sediment run-off stabilizes, sediment control ponds would be removed. Run-on diversion channels and ditches would remain as permanent features after final reclamation and mine closure.

As a result of salvage and stockpiling, growth media would have lower organic content. Soil biological activity would be reduced or eliminated during stockpiling as a result of anaerobic conditions created in deeper areas of stockpiles. Redistribution of soil during reclamation would result in decreased quantity and quality due to compaction from loading, hauling, and placement activities. Soil loss would continue after placement until vegetation is established. Compaction would be reduced by scarifying soil after placement.

The proposed Bluestar Ridge Mine would remain as an open pit following cessation of mining operations. Soil salvaged during development of the Bluestar Ridge Mine pit would be used during reclamation of associated haul roads and the Section 5 Waste Rock Disposal Facility.

In-pit backfill of the Beast, Bluestar, and partial backfill of the Genesis Pit would reestablish about 300 acres of land surface that would be reclaimed with placement of growth media and seeding. Newmont would haul approximately 3.0Mcy of Tertiary Carlin Formation material from the East Lantern Waste Rock Disposal Facility for use as growth media in reclamation of disturbed areas (approximately 985 acres) in the Genesis-Bluestar Operations Area that are not currently under reclamation. With the exception of highwalls that would remain in the Genesis Pit, this material would be combined with previously salvaged growth media to provide two feet of cover over disturbed areas. The East Lantern Waste Rock Disposal Facility is located about one-half mile south of the Genesis Project.

No Action Alternative

Soil resources in the proposed Genesis Project area would not be impacted by implementation of the No Action Alternative since no ground disturbance of undisturbed areas associated with mining activities would occur. Impacts to soil associated with previously authorized ground disturbing activities in the area would continue. Under the No Action Alternative approximately 450 acres would remain as open pits and would not be revegetated. Transport of Tertiary Carlin Formation material from the East Lantern Waste Rock Disposal Facility is not expected.

VEGETATION

Proposed Action

Approximately 43 acres of vegetation in the Project area would be directly affected as a result of excavation of the Bluestar Ridge Mine pit and construction of haul roads. About seven acres of the 26 acre Bluestar Ridge Mine footprint have been previously disturbed by exploration activities (e.g., roads and drill pads). The Bluestar Ridge Mine would remain as an open pit following completion of mining operations; approximately 17 acres associated with haul roads, and exploration activity in the Bluestar Ridge area would be revegetated. The proposed reclamation plan would have a net increase of about 300 acres that would receive growth media and seeding over the No Action Alternative due to the reclamation of backfilled pits. Disturbed areas would be reclaimed and revegetated, restoring habitat for wildlife and serving to partially re-establish connections between habitat areas that are currently separated by the concentration of mining activity in the Carlin Trend. This revegetation would initially be a grass dominated community as opposed to a previously shrub dominated community. This would change land use patterns for the area in terms of species utilization.

Concurrent revegetation during and after mining would likely reestablish permanent and stable vegetation cover within five to ten years, assuming livestock use in the area is deferred and noxious weeds are controlled. The plan's seed mix has been shown to be well suited for the existing climate conditions and has worked well on previous reclamation.

Special-Status Plant Species

No special status plant species would be affected by the Proposed Action.

Invasive, Non-Native Species

Disturbed areas would be susceptible to invasion by undesirable, non-native species (weeds). Noxious weeds would be controlled by an existing weed control program during and after mining operations. Adjacent areas located outside of the Project area would continue to be a source of noxious weeds.

No Action Alternative

Approximately 685 acres of existing reclaimable disturbance would be revegetated. Existing growth media (approximately 622,000cy) would provide over six inches of cover material for revegetation. The

intent of revegetation and impacts from weeds would be the same as for the Proposed Action. Upon completion of existing authorized mining operations approximately 450 acres would remain as open pits and not be revegetated.

Special Status Plant Species

Special status plant species would not be affected by implementation of the No Action Alternative.

Invasive, Non-native Species

Under the No Action Alternative, control of invasive, non-native species would continue under the existing weed control program.

TERRESTRIAL WILDLIFE

Proposed Action

The Proposed Action would result in direct loss of 43 acres of sagebrush/grassland habitat, of which 17 acres would be reclaimed as grassland habitat and 26 acres would remain as an open pit (Bluestar Ridge Pit). An additional 300 acres, compared to the No Action Alternative would be reclaimed and available for wildlife habitat due to the backfilling of existing mine pits. Direct loss of habitat would eliminate forage, cover, breeding sites for small mammals and birds, and nesting cover. Terrestrial wildlife species currently using this habitat would be displaced or killed unintentionally. The proposed addition of 43 acres of disturbance to the existing Genesis-Bluestar Operations Area is not expected to result in a substantive adverse effect on wildlife numbers in the general area.

Impacts of dust, exhaust fumes, and other air pollutants on wildlife may result in temporary displacement due to reduced palatability of vegetation. Impacts would occur primarily downwind from construction and mining activity. Human presence and noise impacts would not change from current conditions. No hazardous wastes would be used in the proposed expansion that could cause an additional risk to wildlife.

Big Game Species

Mule deer are present in the Genesis-Bluestar Operations Area primarily in spring and fall. The general area is located in transition range used by mule deer migrating between high-elevation summer range (Tuscarora Mountains) to the north and low-elevation winter range to the south (Dunphy Hills and southern end of Tuscarora Mountains). Seasonal timing, duration, and routes of mule deer migration and use of transitional range between winter and summer habitat has been affected by ongoing mining activities in the Carlin Trend, which includes the Genesis-Bluestar area. Movement along the western slopes of the Tuscarora Mountains has been inhibited by mining activity. Historic migration routes have been abandoned; deer movement has been effectively restricted to a few key migration routes, including the Lantern Mine area and near the crest of the Tuscarora Mountains just east of the Leeville mine. Lower elevation areas adjacent to the western slopes of the Tuscarora Mountains have been burned by lightning-caused wildfires resulting in removal of large areas of sagebrush and important browse species.

Potential impacts to mule deer, pronghorn, and elk would include the incremental long-term reduction of 43 acres of potential forage and the extended impacts to 2,000 acres during the twelve-year mine life. Habitat fragmentation associated with 43 acres of additional disturbance would increase in the short-term; however, backfilling and reclamation of 300 acres of existing mine pits would restore land surface that would provide habitat supporting wildlife and livestock grazing uses over the long term as compared to the No Action Alternative.

Small Game Species

The Proposed Action would have a similar impact on small game species (e.g., chukar, mourning dove, pygmy rabbit, and black-tailed rabbit) as described for big game with the permanent loss of 26 acres of vegetation associated with the Bluestar Ridge Pit. This acreage loss would be offset by backfill and reclamation of 300 acres of existing mine pits compared to 450 acres of open pits that would remain under the No Action Alternative. In-pit backfilling of mine pits would reestablish land surfaces that would be reclaimed to a desired plant community. Impacts to small game populations would include limited direct mortalities from mining operations, habitat loss or alteration, incremental habitat fragmentation, and animal displacement. Indirect impacts could include increased noise, additional human presence, and the potential for increased vehicle-related mortalities.

Nongame Species

Potential impacts to nongame species (e.g., small mammals, passerine, raptors, amphibians, and reptiles) would be similar to those described above for small game species.

Migratory Birds

Direct loss of habitat would eliminate forage, hiding cover, breeding sites, and nesting cover for birds. Potential impacts to migratory birds would be similar to those described above for small game species.

Special Status Species

The Proposed Action is not expected to impact any special status species because it is unlikely there are any special status species in the area due to the lack of water, lack of preferred habitat, and ongoing mining activities. Special Status Species that could utilize the undisturbed habitat identified in the proposed action are pygmy rabbits, bats, eagles, hawks and other raptors, grouse, shrews, and passerine species.

No Action Alternative

Under the No Action Alternative, potential impacts to terrestrial wildlife and special status wildlife species from development of 43 acres of sagebrush/grassland habitat would not occur. Approximately 450 acres encompassing the Beast, Bluestar, and Genesis pits would not be backfilled and would remain as open pits. A pit lake of about 41 acres would eventually begin to form in the Genesis Pit about 100 years after cessation of dewatering activities at the Betze/Post and Leeville mines. There is no established requirement for an Ecological Risk Assessment (ERA) for the pit lake as the ERA requirement did not exist when the mine was permitted. If the No Action Alternative is selected, BLM will petition NDEP for an ERA reevaluation for pit lake quality. The pit lake would be on private land.

SOCIAL AND ECONOMIC RESOURCES

Proposed Action

All of the work force for the Genesis Project would be from the existing Newmont work force in the Carlin Trend. The Proposed Action, together with other Newmont activities, would provide for long-term operations in the area, with potential for stable employment levels for approximately twelve years. The Project would create more than 9,700 man years of employment over the twelve-year life, representing more than one-third of all mining related jobs in the Elko, Spring Creek, and Carlin area in 2016.

Based on the average annual salary ($79,500) for mine workers, the proposed Project would continue employment producing an average of more than $54 million in annual mining wages and $23 million in annual indirect wages. Thus direct and indirect employment provided by the Genesis Project would average 1,271 jobs and $77 million in annual wages, representing more than five percent of all jobs in Elko County. Continued mine employment at the Genesis Project would maintain quality-of-life for workers and their families and help to maintain the economy of the local area which is highly dependent on mining with some estimates indicating more than two-thirds of wages in the local area are directly or indirectly related to mining. Tax revenues to support local and state government run parallel with employment. Tax revenue for both Eureka and Elko County would be generated by the Genesis Project.

At the end of the Genesis Project, if no replacement employment is available, the remaining jobs associated with the Genesis Project will be lost. This effect is similar and perhaps identical to the No Action Alternative, but the additional twelve years of employment would allow additional time for new industry to develop in the Elko area and perhaps provide alternative employment when mining at the Genesis Project winds down.

No Action Alternative

Under the No Action Alternative, employment at Newmont would decrease by 211 jobs in 2010 and there would be 1,164 fewer jobs at Newmont in 2016, representing almost one-third of all mining jobs currently expected to exist in the local area if the Proposed Action were to be approved. Related impacts would include increased unemployment, reduced wages spent in the local economy, decreased revenue to local and state jurisdictions, increased stress on public assistance programs, and decreased quality-of-life for some residents. Ongoing mineral exploration and development throughout northern Nevada may offer employment opportunities in the region thereby offsetting the effect of the No Action Alternative.

SUMMARY OF POTENTIAL IMPACTS

A comparison of impacts associated with the Proposed Action and No Action Alternatives is contained in **Table S-1**.

AGENCY PREFERRED ALTERNATIVE

The agency preferred alternative is the Proposed Action, which is the revised Genesis Project proposed in November 2007 as modified during the review process to address various concerns. One such concern was the inadequate supply of growth media, which resulted in a modification of the proposed Project: Newmont proposes to haul 3.0Mcy of Carlin Formation material from the East Lantern Mine Waste Rock Disposal Facility to the Genesis Project area for reclamation.

TABLE S-1
Summary Comparison of Alternatives

Resource	No Action Alternative	Proposed Action
Mining Operations	Approximately 2.6Mt of run-of-mine oxide ore will be placed on the North Area Leach Facility. Newmont does not anticipate processing any oxide mill or refractory ore during the remaining mine life under authorized operations.	Removal of 450Mt of waste rock and 60 Mt of ore over a twelve-year mine life.
	About 450 acres remaining as open pits	Backfill of additional 300 acres of mine pits
	Formation of pit lake of about 41 acres	Elimination of pit lake
Reclamation Activities	About 450 acres of open mine pits would remain and not be revegetated	Revegetation of additional 300 acres that would have remained as open pits
	Disturbed areas would be reclaimed in accordance with existing approved plans.	All disturbed areas not currently under reclamation would be covered with 2-feet of Carlin Formation growth media.
Air Quality	Sulfur dioxide (SO_2), carbon monoxide (CO) oxides of nitrogen (NO_X), volatile organic compounds (VOCs) and particulate emissions will continue to be generated until currently permitted mining activities cease in 2010.	Gaseous and particulate emissions would be extended for twelve years. Approximately 65,000 tons of CO_2 would be emitted annually from approximately 5.87 million gallons of diesel fuel consumed annually.
Greenhouse Gas	Approximately 4,100 tons of CO_2 would be emitted annually from consumption of 370,000 gallons of diesel fuel	Approximately 65,000 tons of CO_2 would be emitted annually from approximately 5.87 million gallons of annual diesel fuel consumption.

TABLE S-1
Summary Comparison of Alternatives

Resource	No Action Alternative	Proposed Action
Mercury Emissions	No oxide mill or refractory ore will be mined at Genesis or processed at Mill 6 during the remaining mine life (ending 2010).	Emission factors based on 2008 source testing (Newmont 2009) for Newmont's South Operations Area indicates that 99.89 percent of the mercury present in the ore is retained or removed through emission controls at the roaster and carbon regeneration. As a result, the average annual mercury emissions from 46,440 lbs. of available mercury in Genesis ore would be 51.2 lbs. Given that the mercury content of Genesis Project ore is low (4.8ppm) compared with other ore sources, when combined with control technology, processing Genesis refractory ore as a batch or blended with other ore would not increase annual mercury emissions from the Mill 5/6 facility but would increase total emissions due to the processing of gold from the 60 million tons of ore from the project.
Geology and Minerals	Approximately 450 acres of mine pits will remain open. 60Mt of ore and 450Mt of waste rock would not be mined. Mining would end in 2010.	Waste rock would be used to backfill mined-out pits or placed in waste rock disposal facilities. Backfilling would reduce access to remaining resources.
	Potentially acid generating (PAG) waste rock (if any) will be placed in an encapsulation cell constructed at the Section 36 Waste Rock Disposal Facility.	An expected 28Mt of PAG waste rock would be encapsulated in cells constructed within backfilled portions of mine pits and in the Section 5 and Section 36 Waste Rock Disposal facilities.
Surface Water and Groundwater Quantity and Quality	No perennial or ephemeral flowing streams or drainages are located within the footprint of existing permitted activities.	No perennial or ephemeral flowing streams or drainages are located within the footprint of the Proposed Action.

TABLE S-1
Summary Comparison of Alternatives

Resource	No Action Alternative	Proposed Action
	The existing Genesis Pit lies within the regional groundwater system which is being dewatered due to ongoing dewatering activities at Barrick Goldstrike Operations and Newmont's Leeville Mine.	Pumping (up to 250 gpm) would occur in compartmentalized areas of the Vinini Formation. The groundwater at this location is not in direct communication with the regional groundwater system and thus pumping would not impact the regional groundwater system.
	A pit lake (about 41 acres) would begin forming in the Genesis Pit approximately 100 years after cessation of regional mine dewatering. Due to evaporation and water reactions with the pit walls, the lake would exhibit decreased water quality, compared to pre-mining groundwater water quality. Water in the pit lake would eventually mix with adjacent groundwater. Predicted water quality effects would be minimal and would not represent an environmental impact of concern.	A pit lake would not develop because of backfilling. As the regional groundwater system rebounds following cessation of regional dewatering, waste rock backfill in the Genesis Pit would react with incoming groundwater and temporarily result in relatively high concentrations of constituents including sulfates and metals. These constituents would be diluted by increasing volumes of rebounding groundwater and attenuation by the large volume of carbonate rock in the backfill. The temporary higher concentrations are not expected to have any environmental impact.
Soil Resources	Reclamation of 685 acres of disturbance would begin in 2010. Approximately 622,000cy of growth media will provide a minimum of 6 inches of cover material for revegetation.	There would be 43 acres of new disturbance. Concurrent reclamation of some parts of the operations would occur during mining operations. 985 acres of disturbance would be in reclamation by 2021. About 3.0Mcy of growth media (Carlin Formation) would be hauled from the East Lantern Waste Rock Disposal Facility to provide two feet of cover over the 985 acres, including 300 acres of backfilled pits. Approximately 150 acres of open pits and highwall would not be reclaimed.

TABLE S-1
Summary Comparison of Alternatives

Resource	No Action Alternative	Proposed Action
Vegetation	Revegetation of 685 acres of disturbance would begin in 2010, with 450 acres remaining as open pits.	43 acres of existing pre-mining vegetation would be disturbed. Approximately 985 total acres would be reclaimed and revegetated, 300 more acres than the No Action Alternative. Revegetation, except for concurrent reclamation, would occur about twelve years later than the No Action Alternative. All 985 acres would be covered with two feet of growth media.
	All disturbed areas are potentially subject to invasion by noxious/non-native weeds. An ongoing weed control program is expected to eradicate noxious weeds and limit the spread of non-natives.	Invasive, non-native species may spread to newly disturbed areas. An ongoing weed control program would be expected to eradicate noxious weeds and limit the spread of non-native species.
Terrestrial Wildlife	Reclamation of disturbance would begin in 2010. , restoring approximately 685 acres as habitat, but leaving 450 acres as open pits. No impacts to special status wildlife species.	43 acres of sagebrush/grassland habitat would be disturbed. Reclamation in the Project area, except for concurrent reclamation, would be delayed by up to twelve years, extending fragmentation of wildlife habitat.
		No impacts to special status wildlife species.
		Backfilling mine pits would provide a net increase of about 300 acres that would be reclaimed for wildlife habitat.

TABLE S-1
Summary Comparison of Alternatives

Resource	No Action Alternative	Proposed Action
Social and Economic Resources	Newmont's Carlin workforce would be reduced by 211 employees beginning in 2010 increasing to a loss of 1,164 jobs by 2016 relative to employment levels that would be supported by the Proposed Action. Related impacts include reduced wages spent in the local economy, decreased revenue to local and state government, increased stress on public assistance programs, and decreased quality-of-life for some residents.	Newmont employs about 1300 workers in surface operations in the Carlin Trend, many of which would work at the Genesis Project during the twelve-year mine life thereby helping to maintain a stable economy in the local area. No additional employees would be hired for the Genesis Project. Tax revenues to local and state government would be maintained.

DRAFT
ENVIRONMENTAL IMPACT STATEMENT
GENESIS PROJECT

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1.0 INTRODUCTION

The Elko District Office of the United States Department of the Interior, Bureau of Land Management (BLM) received a revised Plan of Operations from Newmont Mining Corporation (Newmont) in November 2007, proposing an amendment to the Genesis-Bluestar Operations Area (NVN - 70712). The proposed Amendment to the Plan of Operations includes expansion and development of open pit mines and associated support facilities located within the previously permitted boundary for the Genesis-Bluestar Operations Project (Project) area. The Project is located on public and private land in Eureka County, Nevada, approximately 20 miles north of Carlin, Nevada (**Figure 1-1** and **Figure1-2**).

Proposed facilities in the Project area would be located in part on public land administered by BLM; consequently, review and approval of Newmont's revised Plan of Operations is required by BLM pursuant to Title 43, Code of Federal Regulations (CFR), Part 3809 (43 CFR 3809) Surface Management Regulations. BLM's decision regarding the proposed Project must also conform to requirements of the National Environmental Policy Act of 1969 (NEPA). Due to the potential for the proposed Project to result in significant environmental impacts, BLM determined that an Environmental Impact Statement (EIS) would be necessary under NEPA. A Notice of Intent to prepare an EIS appeared in the *Federal Register* on March 18, 2008 (Vol. 73, No. 53, Page 1448). BLM is serving as lead agency in preparing this EIS. The Nevada Department of Wildlife (NDOW) and Elko County are cooperating agencies.

This EIS incorporates by reference Newmont's 2007 Genesis Project Plan of Operations Amendment (Newmont 2007a), and previous authorizations and other environmental analyses of mining activities in the Genesis-Bluestar Operation Area as listed in **Table 1-1**. These documents are available for inspection upon request to the Elko District Office.

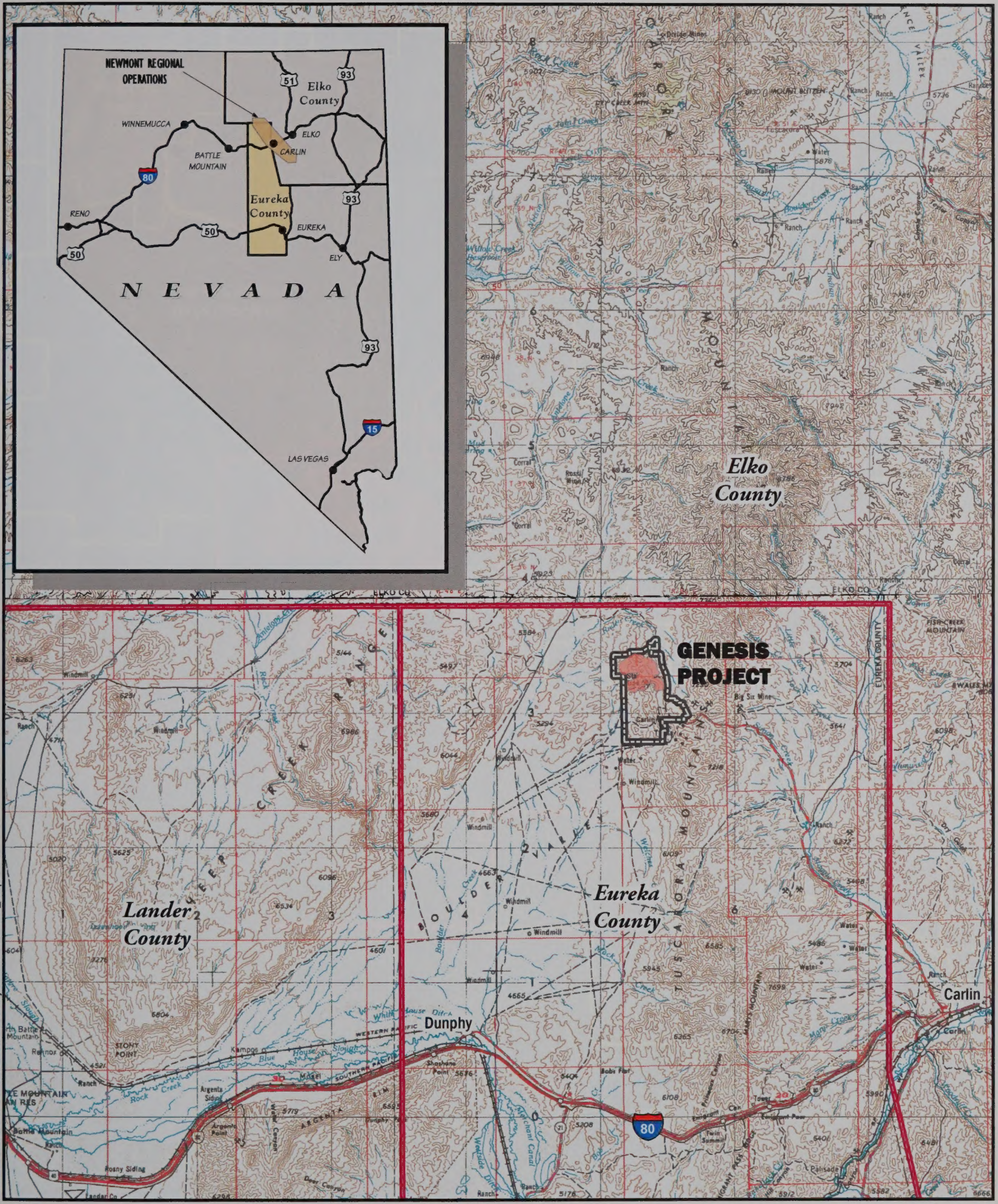
1.1 DOCUMENT ORGANIZATION

This document is compiled in accordance with regulations promulgated by the Council on Environmental Quality (CEQ) for implementing procedural provisions of NEPA (40 CFR 1500-1508) and BLM's NEPA Handbook (H-1790-1). This EIS describes components of, and environmental consequences of, proposed mining and waste rock disposal operations in the Project area. Chapter 1 describes the purpose of and need for action, the role of BLM, and identifies issues raised through public scoping. Chapter 2 provides a description of past and current mining operations, the proposed amendment to the Plan of Operations (Proposed Action), and the No Action Alternative. Chapter 3 describes the affected environment in the Project area; environmental consequences including potential direct and indirect impacts associated with the Proposed Action and No Action Alternative; past, present, and reasonably foreseeable future activities in the Project area that form the basis for disclosing potential cumulative effects; and mitigation measures that may be selected to reduce or minimize impacts. Chapter 4 identifies the consultation and coordination with public, state, and federal agencies that occurred during preparation of this EIS. Chapter 5 provides a list of preparers and reviewers of the document and Chapter 6 contains references cited in the EIS. **Appendix A** contains the Adaptive Management Plan (AMP) for Waste Rock, **Appendix B** and **B-1** contains summaries of the wall rock and waste rock geochemical reports, and expected geochemical impacts of the Proposed Action and No Action Alternatives.

TABLE 1-1 Environmental Analyses Genesis Project Area	
Document	**Description**
Environmental Assessment (EA-NV-010-9-048) for the Newmont Gold Company's Blue Star Operations Area, Eureka County, Nevada (BLM 1989). Finding of No Significant Impact/Decision Record: Blue Star Plan of Operations 3809(NV-014); N16-88-7P (May 25, 1989).	Analyzed impacts on physical, biological, and human resources associated with mineral exploration and drilling throughout the Blue Star Operations Area, continued mining in the existing Genesis and Blue Star mines, expansion of the Section 5 Waste Rock Disposal Facility, and construction of the North Waste Rock Disposal Facility.
Environmental Assessment BLM/EK/PL-95/003 Newmont: Section 36 Project (BLM 1995). Finding of No Significant Impact/Decision Record: Newmont Section 36 Project BLM/EK/PL-95/003 N16-88-007P (February 27, 1995)	Analyzed impacts on physical, biological, and human resources associated with construction of the Section 36 Waste Rock Disposal Facility, vertical expansion of the Section 5 Waste Rock Disposal Facility, development and operation of five open pit mines (Payraise, Sold, Beast, North Star, and Bobcat), and continued exploration activities.
Environmental Assessment BLM/EK/PL-96/016 Newmont: Lantern Mine Expansion Project (BLM 1996). Decision Record: Newmont Lantern Mine Expansion Project BLM/EK/PL-96/016 N16-88-007P (September 16, 1996)	Analyzed impacts on physical, biological, and human resources associated with expansion of the Lantern open pit mine, North Area Leach Facility, and North Waste Rock Disposal Facility, construction of the Lantern South Waste Rock Disposal Facility, and development of ancillary facilities.
Cumulative Impact Analysis of Dewatering and Water Management Operations for the Betze Project, South Operations Area Project Amendment, and Leeville Project (BLM 2000)	Analyzed impacts of dewatering on physical, biological, and human resources. Analyses included the Genesis Project area.
Draft Supplemental Environmental Impact Statement Leeville Project (BLM 2007a).	Provided expanded and updated analyses of cumulative effects originally presented in the Leeville Project EIS. Analyses included the Genesis Project as a reasonably foreseeable future action.

1.2 PURPOSE OF AND NEED FOR ACTION

The purpose of Newmont's proposed Plan of Operations Amendment is to extend the mine life of Genesis-Bluestar operations using its existing work force to continue open pit mining on unpatented mining claims and fee land within the Project area to produce gold from ore reserves. BLM is responsible for managing mineral rights access on certain public land as authorized under the General Mining Law of 1872, as amended. Under the law, persons are entitled to reasonable access to explore for and develop mineral deposits on public domain lands that have not been withdrawn from mineral entry.



Genesis Project

Genesis-Bluestar Operations Area

General Location Map
Genesis Project
Eureka County, Nevada
FIGURE 1-1

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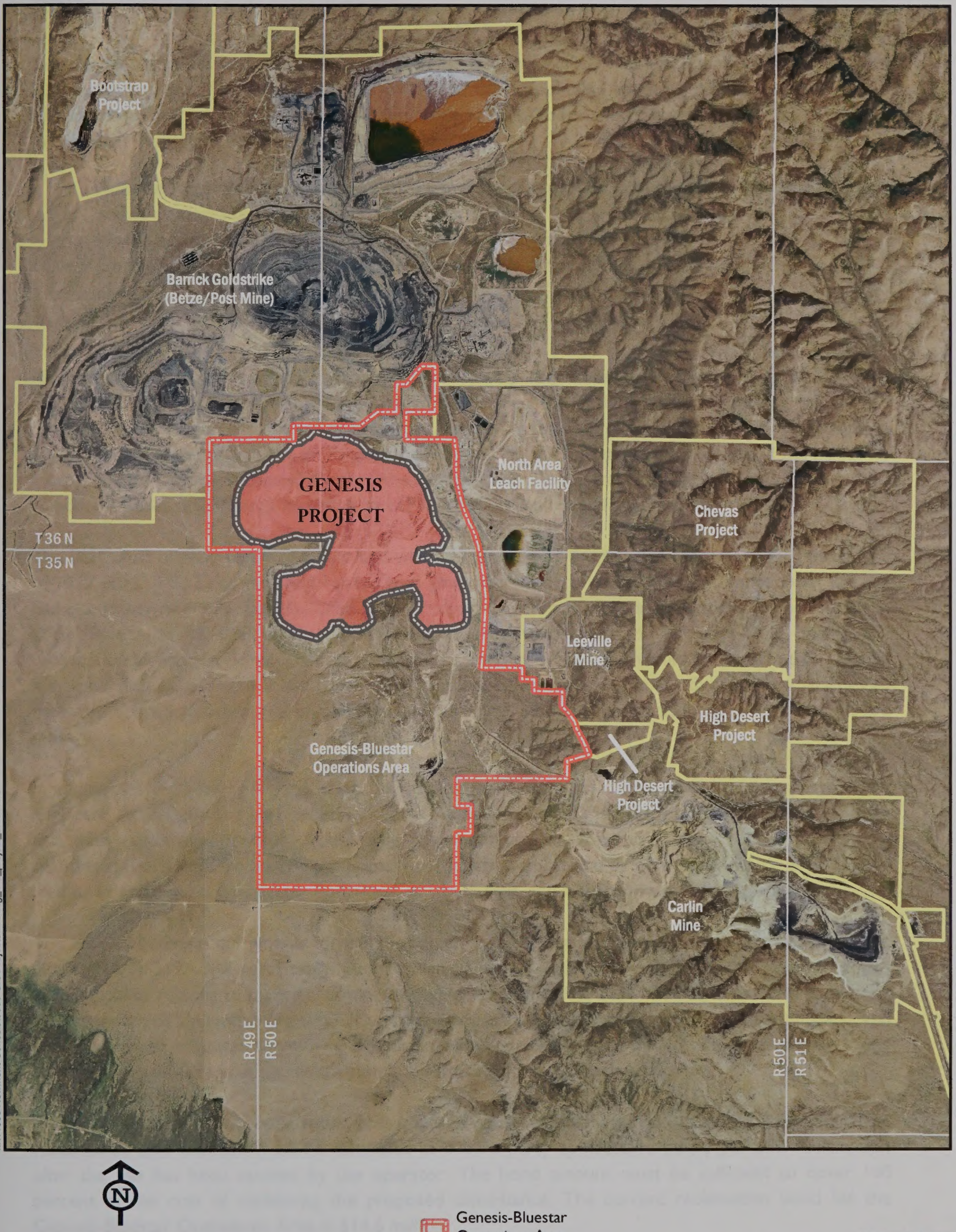

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Project Area
Genesis Project
Eureka County, Nevada
FIGURE 1-2

In order to use public land managed by the BLM Elko District Office, Newmont must comply with BLM Surface Management Regulations (43 CFR 3809) and other applicable statutes, including the Mining and Mineral Policy Act of 1970 (as amended) and Federal Land Policy and Management Act of 1976. BLM must review Newmont's plans to ensure the following:

- Adequate provisions are included to prevent unnecessary or undue degradation of public land and to protect non-mineral resources of public land;
- Measures are included to provide for reclamation of disturbed areas; and
- Compliance with applicable state and federal laws is achieved.

1.3 AUTHORIZING ACTIONS

Plan amendments submitted to BLM may be approved only after an environmental analysis is completed and disclosed to the public, as required by NEPA. BLM decision options include approving Newmont's Plan of Operations for the Project as submitted, approving the Plan of Operations with stipulations to mitigate environmental impacts, or denying the revised Plan of Operations (No Action). If BLM declines to approve the proposed Genesis Project, the applicant may modify and resubmit the Plan of Operations to address issues or concerns identified by BLM on the original Plan of Operations.

The BLM must prevent abuse of public land while recognizing valid rights and uses under the Mining Law of 1872 (30 U.S.C. 22 et seq.) and related laws governing public land. BLM has determined that the use and occupancy of public land identified in the Proposed Action is reasonably incident to the Project in accordance with 43 CFR 3715 – Use and Occupancy under the Mining Laws. The mining and reclamation plans must be designed to minimize the amount of land that would be disturbed to develop mine pits, dispose of overburden, process ore, and construct haul roads and other ancillary facilities to meet Project requirements and ensure that applicable environmental protection and safety standards are met.

In addition to BLM, other federal, state, and local agencies have jurisdiction over certain aspects of the Proposed Action and are considered as connected actions under the NEPA process. A list of agencies and their respective permitting/authorizing responsibilities is shown in **Table 1-2**. In addition to securing authorization from BLM, the primary permits to be obtained by Newmont include amendments to the reclamation permit, Water Pollution Control Permit, and a storm water discharge permit.

The NDEP bonding requirements for mine reclamation in Nevada are outlined in Nevada Administrative Code (NAC) 519A.380 regulations. Surface Management Regulations (43 CFR 3809) establish BLM's bonding policy relating to mining and mineral development. In 2002, BLM and NDEP updated an existing Memorandum of Understanding (MOU) to coordinate evaluation and approval of reclamation plans, and determine bond amounts for mining and exploration operations. The MOU allows submittal of one bond by an operator to satisfy reclamation bond requirements for both agencies.

Operators must provide a reclamation cost estimate when submitting a Plan of Operations to BLM. The reclamation cost estimate must be calculated as if third party contractors would perform reclamation after the site has been vacated by the operator. The bond amount must be sufficient to cover 100 percent of the cost of reclaiming the proposed disturbance. The current reclamation bond for the Genesis-Bluestar Operations Area is $14.6 million.

TABLE 1-2 Regulatory Responsibilities	
Authorizing Action	**Regulatory Agency**
Plan of Operations/Rights of Way	Bureau of Land Management (BLM)
National Environmental Policy Act	BLM
National Historic Preservation Act	BLM; Nevada Division of Historic Preservation & Archaeology
Native American Graves Protection & Repatriation Act	BLM
American Indian Religious Freedom Act	BLM
Clean Water Act (Section 404)	United States Army Corps of Engineers (USCOE)
Storm Water Permit	Nevada Division of Environmental Protection (NDEP), Bureau of Water Pollution Control
Air Quality Permit	NDEP, Bureau of Air Pollution Control
Water Pollution Control Permit	NDEP, Bureau of Mining Regulation & Reclamation
Mine Reclamation Permit/Bonding	NDEP, Bureau of Mining Regulation & Reclamation/BLM
Water Rights	Nevada Division of Water Resources

1.4 RELATIONSHIP TO BLM AND NON-BLM POLICIES, PLANS, AND PROGRAMS

1.4.1 Federal Land Use Plan Conformance

BLM has responsibility and authority to manage surface and subsurface resources on public land located within the jurisdiction of the Elko District Office. In accordance with the Record of Decision (ROD) for the Elko Resource Management Plan (BLM 1987), BLM has designated land within the Genesis Project area as open for mineral exploration and development. The Plan of Operations has been reviewed for compliance with BLM policies, plans, and programs. The proposal is in conformance with the minerals decisions in the ROD, Elko Resource Area, Resource Management Plan, approved in March 1987. The Elko Resource Management Plan Record of Decision (BLM 1987) established the objective to "Maintain public lands open for exploration, development and production of mineral resources while mitigating conflicts with wildlife, wild horses, recreation and wilderness resources" (BLM 1987).

1.4.2 State and Local Land Use Plans and Policies

The State of Nevada recognizes that mining is an important contributor to the state's economy and encourages development of mineral resources. The State policy towards mining and reclamation is defined in NAC 519A.010 as:

(a) The extraction of minerals by mining is a basic and essential activity making an important contribution to the economy of the State of Nevada;

(b) Proper reclamation of mined land, areas of exploration and former areas of mining or exploration is necessary to prevent undesirable land and surface water conditions detrimental to the ecology and to the general health, welfare, safety and property rights of the residents of this state; and

(c) The success of reclamation efforts in this state is dependent upon cooperation among state and federal agencies.

The proposed project is consistent with state policies. BLM has coordinated with NDEP Bureau of Mining Regulation and Reclamation (BMRR) in reviewing the mining operation and reclamation plans.

The Natural Resource and Land Use Element chapter of the Eureka County Master Plan (Eureka County 2007) provides general policy guidance and management objectives as the basis for County-preferred land uses and management practices on federal and state administered public land. The Planning Commission's approval of the 2007 plan recognizes that the economic and social stability of Eureka County are inseparably tied to the use of natural resources. Over 90 percent of Eureka County employment is in the Natural Resources and Mining Sector, and state and federal administered public land comprises 81 percent of Eureka County. Community stability in Eureka County is a symbiosis between the small private land base and the larger federal land base. Private property interests in minerals and other natural resource attributes of public land rest on the continued multiple-use and economic-use of state and federal land in Eureka County. The proposed Genesis Project is consistent with the policies in this plan, which includes promoting expansion of mining operations.

Elko County has formally cooperated with BLM in preparation of this EIS. The Elko County Public Lands Policy Plan (2008) provides descriptions of issues and opportunities relating to public land and a process that enables federal land management agencies to understand and respond to the concerns of Elko County in a collaborative fashion. Specific to mineral resources under Section 14, the Lands Policy Plan states that development of Nevada's mineral resources is desirable and necessary to the economy of the nation, state, and particularly Elko County and that Elko County both supports the Mining Law of 1872 and opposes any policy or regulatory revision that may result in overregulation. The plan also asserts that federal land management agencies should continue to enforce mine site, exploration, and reclamation standards that are consistent with the best possible post mine use of each specific area to ensure there is no undue degradation of public land.

1.5 SUMMARY OF ISSUES

1.5.1 Issues Raised During Scoping

Public and agency scoping comments concerning the Proposed Action are shown in **Table 1-3**. This table also provides references to the sections of this EIS in which each issue is addressed.

1.5.2 Major Issues

Major issues identified by the agencies during review of the Genesis Project Plan of Operations Amendment include the following:

- Social and economic impacts to the local and regional economy from labor income, tax revenues, and continued employment resulting from the Proposed Action;
- Potential impacts of dewatering compartmentalized groundwater east of the Gen Fault on the regional water system; and
- Classification and management of potentially acid-generating (PAG) rock.

TABLE 1-3
Scoping Summary

Issue	Where Addressed
Mining and Reclamation	
Effects of backfilling mine pits with potentially acid generating waste rock.	Chapter 2 – Section 2.3.5 Chapter 3 –Sections 3.4.2.2 and 3.4.3.2
Waste rock analysis including kinetic testing	Chapter 3 – Section 3.4.2.2 & Appendix B and B-1
Potential for acid mine drainage	Chapter 3 – Sections 3.4.2.2 and 3.4.3.2 Appendix A
Backfill mine pits to blend with surrounding topography.	Chapter 2 – Section 2.3.13.3
Closure of heap leach facility and disposal of process solution.	Beyond the scope of this document
Analyze various sources and subsequent release of mercury to the atmosphere.	Chapter 3– Section 3.4.1.2 and 3.4.1.3
Water Quantity and Quality	
Analyze effects of dewatering and its cumulative impacts in the region.	Chapter 2 – Section 2.3.4 Chapter 3 – Sections 3.4.3.2 and 3.4.3.3
Model future changes in groundwater flow and post-mining levels.	Section 3.4.3.2 Appendix B and B-1
Wildlife and Vegetation	
Potential impacts resulting from mine development to wildlife habitat and migration corridors, roosting habitat for bats, and sage grouse habitat including leks, and other sensitive habitat.	Chapter 3 – Sections 3.4.6.2 and 3.4.6.3
Land Use and Access	
Describe fencing and maintenance responsibility and mitigation plans to deal with reduced public access, livestock crossing, recreational and grazing access as a result of the proposed Project.	Chapter 2 – Section 2.2.1.5 and 2.3.13.2 Chapter 3 – Sections 3.2.2, 3.2.3, and 3.2.4
Visual Resources	
Visual impacts and potential mitigation measures to reduce or eliminate impacts to the natural environment.	Chapter 3 – Section 3.2.5
Cultural Resources	
Surveys and mitigation plans for historical and archaeological artifacts identified in the Project area.	Chapter 3 – Sections 3.2.6 and 3.2.7
Impact on Native Americans to practice traditional religions in the Project area including sacred and spiritual sites, and traditional food and medicine gathering locations.	
Social and Economic Resources	
Social and economic impacts including extension of employment at the mine.	Chapter 3 – Section 3.4.7.2 and 3.4.7.3

Social and economic resources for the Elko Micropolitan Study Area (Elko, Spring Creek, Carlin and adjacent unincorporated communities) are described in Section 3.4.7.1. Potential effects of dewatering are addressed in Section 3.4.3.2 – Water Quantity and Quality. Classification and management of potentially acid-generating (PAG) rock is described in the Rock Characterization subsection of Section 3.4.2 – Geology and Minerals and in **Appendix B** and **B-1**.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION AND BACKGROUND

This chapter describes Newmont's existing mining operations in the Genesis-Bluestar Operations Area authorized under BLM NVN-70712 and NDEP Permit 0096 (the No Action Alternative), and the currently proposed amendment to the Genesis-Bluestar Plan of Operations. The proposed amendment is referred to as the Genesis Project (Project) or the Proposed Action in this document.

Analysis to date has not found any substantive resource impact for which an alternative would be practical or appropriate. To date, neither the BLM, cooperating agencies nor any public comment has identified an alternative that might address/reduce/obviate any potential impact of the Proposed Action. If an alternative is proposed that is feasible and addresses a substantive impact in a meaningful way, the BLM will analyze that alternative. Therefore, the only alternative discussed in detail in this EIS is the No Action Alternative. Under the No Action Alternative, BLM would deny Newmont's proposal to amend the Genesis-Bluestar Plan of Operations. Existing operations in the Genesis-Bluestar Operations Area would continue in accordance with authorizations provided under BLM NVN-70712 and NDEP Permit 0096.

This chapter also provides a comparison of the No Action and Proposed Action alternative, presents alternatives considered but eliminated from detailed analysis, and identifies the agency's preferred alternative.

The proposed Genesis Project would be located within Newmont's Genesis-Bluestar Operations Area in Sections 25 and 36, Township 36 North, Range 49 East, Sections 30, 31, and 32, Township 36 North, Range 50 East, and Sections 3, 4, and 5, Township 35 North, Range 50 East, Mount Diablo Baseline and Meridian. Surface ownership is shown on **Figure 2-1**.

The proposed Genesis Project is located along the western side of the Tuscarora Mountains within the Boulder Flat hydrographic area. North-trending mountain ranges bound intervening basins partially filled with alluvium and colluvium from adjacent slopes. The Tuscarora Mountains drainage divide forms the boundary between the Maggie Creek basin on the east and Boulder Creek basin on the west. In the general Project area, elevations range from about 7000 feet above mean sea level (amsl) in the mountains to about 4900 feet amsl at the bottom of the existing Genesis pit.

The Bluestar Mine was developed between 1971 and 1974, and milling of ore from the mine commenced in 1975. In 1989, Newmont received approval to continue exploration and drilling throughout the Genesis-Bluestar Operations Area, continue mining the existing Genesis and Bluestar open pit mines, expand the existing Section 5 Waste Rock Disposal Facility, and construct the North Waste Rock Disposal Facility (BLM 1989). In 1995, Newmont received authorization to construct the Section 36 Waste Rock Disposal Facility, expand the Section 5 Waste Rock Disposal Facility vertically, develop and operate five open pit mines (Sold, Beast, North Star, Payraise, and Bobcat), and continue exploration activities (BLM 1995).

2.2 NO ACTION ALTERNATIVE

The No Action Alternative represents the existing site conditions, including past and ongoing mining, inside the Genesis-Bluestar Operations Area. Under the No Action Alternative, mining will be completed in 2010. Reclamation activities will continue for several years thereafter.

2.2.1 EXISTING OPERATIONS

Mining operations in the Genesis-Bluestar Operations Area were authorized under BLM NVN-70712 and NDEP Permit 0096. Development and operation of the Genesis-Bluestar Mine began in the early 1970s on private land owned by Newmont. Subsequent authorizations by NDEP and BLM allowed Newmont to expand mining operations on private and public land (BLM 1989), develop new ore bodies, and construct additional waste rock disposal facilities and haul roads (BLM 1995). Under these existing authorizations, mining in the Genesis-Bluestar area will continue into 2010. Existing operations are shown on **Figure 2-2**.

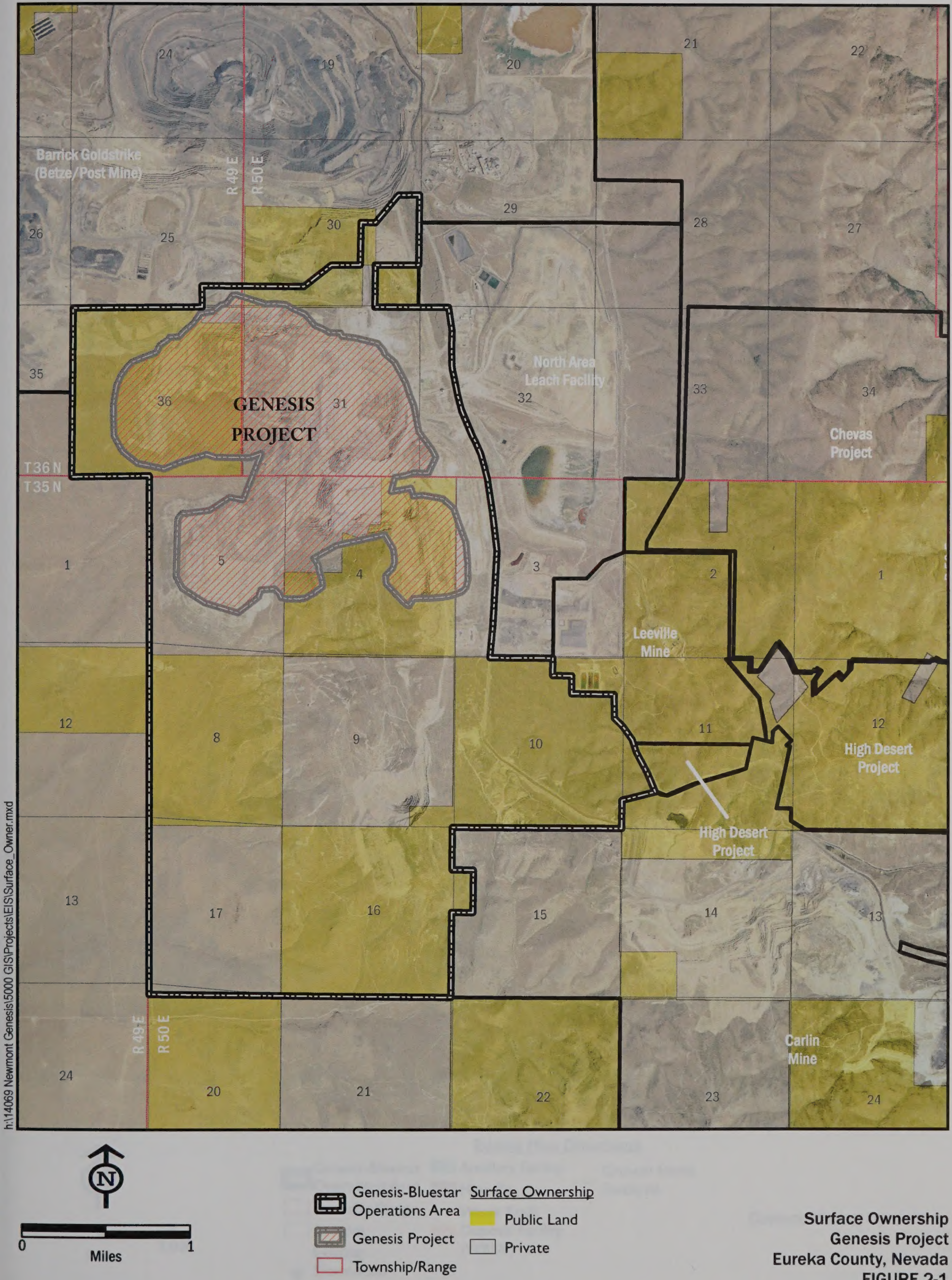
2.2.1.1 Mine Pits

Since mining operations in the Genesis-Bluestar Operations Area began, Newmont has developed seven mine pits. The Genesis and Bluestar pits were developed in the early 1970s. Information concerning ore and waste rock production prior to 1989 is not available for the Genesis and Bluestar mines. During the period 1989 through 1993, about 115 million tons (Mt) of ore and waste rock were mined from the two pits (BLM 1995). In June 1994, Newmont submitted an amendment to the Genesis-Bluestar Plan of Operations to develop five additional pits (Sold, Beast, Payraise, North Star, and Bobcat) totaling approximately 400 acres. The amendment was authorized in a Decision Record issued in February 1995.

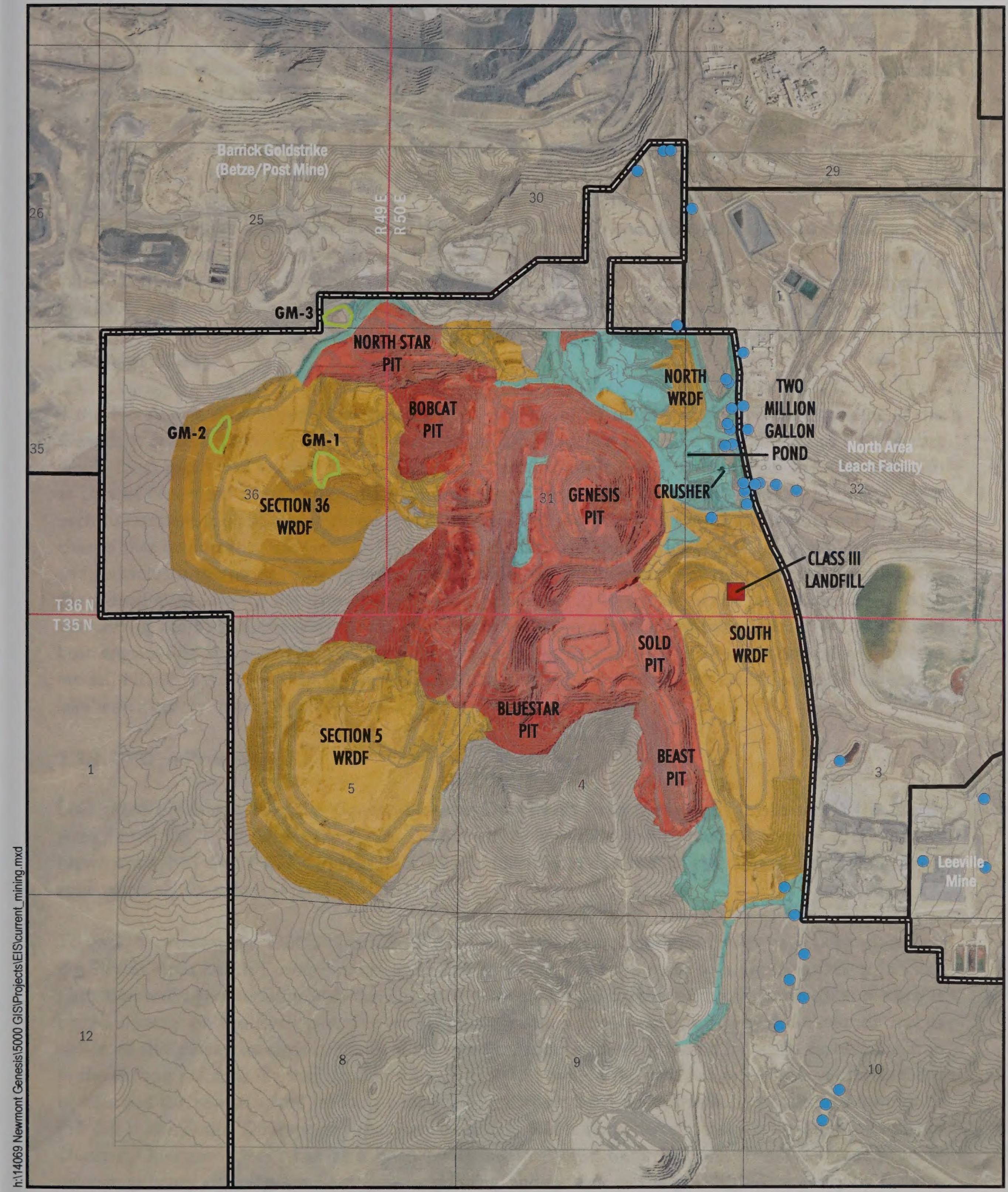
The Sold, Beast, North Star, and Bobcat pits were mined during the period of 1995 to 2005 and generated about 74Mt of ore and over 200Mt of waste rock. During this period the Genesis and Bluestar pits were expanded to become one pit. The Bluestar portion was mined to a depth of 5320 feet amsl and the Genesis portion to a depth of 4980 feet amsl. The Beast Pit was mined to a depth of 5540 feet amsl and eventually expanded to incorporate the Sold Pit. The Payraise Pit has not been mined as of the date of this document. Due to the low grade of ore Newmont is uncertain as to when or if the deposit will be mined. The mine would encompass 31 acres, 22 of which have been previously disturbed by exploration activity.

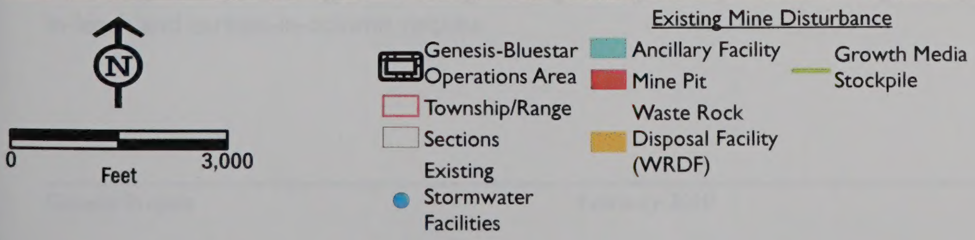
By 2005, mining operations in the Genesis-Bluestar area were beginning to decline as ore reserves were depleted and gold prices remained stagnant. Exploration operations to define deeper reserves continued.

Current operations include mining of the Bobcat and a small portion of the Genesis-Bluestar pit. Waste rock from these operations is being placed in the Section 36 Waste Rock Disposal Facility. Oxide ore produced from these mine pits is hauled to Newmont's North Area Leach Facility. Mining in the Sold Pit will continue into 2010. Waste rock from the Sold Pit is used as backfill for underground operations at the Leeville Project.



Surface Ownership
Genesis Project
Eureka County, Nevada
FIGURE 2-1





Current Mining Operations
Genesis Project
Eureka County, Nevada
FIGURE 2-2

Under existing authorizations, approximately 450 acres of mine pits (Genesis, Bluestar, Sold, Beast, North Star, and Bobcat) would remain as open pits at closure (BLM 1989, 1995). The Genesis portion of the Genesis-Bluestar Pit was the only pit mined to a level below the pre-dewatering groundwater level (5265 feet amsl). The Genesis Pit lies within the groundwater drawdown area from ongoing dewatering activities at Barrick's nearby Betze/Post Mine and Newmont's Leeville Project.

Dewatering activities at these facilities are currently predicted to end about 2018. Due to the lag time of rebounding groundwater, approximately 100 years would elapse before groundwater will intersect and inflow to the Genesis Pit. Groundwater inflow to the pit is projected to be about 90 percent complete by 2350. Final predicted pit lake elevation of 5225 feet amsl is estimated to occur about 400 years after cessation of dewatering activities, and the pit lake would have a surface area of about 41 acres (Geomega 2008a).

If the No Action Alternative is selected by BLM, or Newmont decides to forego development of the Genesis Project, NDEP may require an updated pit lake model be compiled for the Genesis Pit lake that would form under the current Plan of Operations authorization. NDEP would make the determination as part of Newmont's Water Pollution Control permit issued for the North Area Leach Facility. With each subsequent application for renewal of the Water Pollution Control Permit or operational or facility change that could affect the Genesis Pit lake predictive model, Newmont would be required to update and re-evaluate the model. Any update or modification would include: 1) all new data developed during the period elapsed since the date of the previous submittal; 2) an update of the most likely scenario or alternative; and 3) as applicable, revised conclusions and recommendations based on current NACs and best engineering and scientific principles and practices. As part of their review of the updated pit lake model, NDEP may require an Ecological Risk Assessment be completed to assess potential effects pit lake water quality may have on wildlife.

2.2.1.2 Ore Processing

Low grade oxide ore from the Genesis-Bluestar Operations Area is currently processed at the North Area Leach Facility (NDEP Permit No. 0176), while high grade and refractory ore are processed at Newmont's Mill 5/6 (NDEP Permit No. 0096). Mill 5/6 is located in the South Operations Area, approximately six miles north of Carlin.

To date, approximately 130Mt of ore from the Genesis-Bluestar Operations Area have been placed on the North Area Leach Facility. Leach-grade ore is hauled from the mine to a crushing facility for size reduction and agglomeration with cement prior to being placed on the leach pad, although some ore is placed directly on the leach pad. The ore is leached with a low-concentration cyanide solution that is collected and passed through columns of activated carbon. Gold is recovered from the cyanide solution in the carbon columns. Barren cyanide solution (solution where the gold has been removed by carbon) is returned for re-use in the leaching process. The carbon handling and refining occurs at Newmont's Mill 5/6 in the South Operations Area. Approximately 9.2Mt of oxide/refractory ore from the Genesis-Bluestar Operations Area has also been processed at Newmont's Mill 5/6. The treatment process involves primary crushing, semi-autogenous grinding, and cyanide leaching with gold recovery by carbon-in-leach and carbon-in-column circuits.

Approximately 520,000 tons of oxide mill ore and 2,400 tons of refractory ore from the Genesis-Bluestar Operations Area were processed at Mills 5 and 6 respectively, in 2007. No oxide or refractory ore from the Genesis-Bluestar Operations Area was processed at these mills during 2008.

2.2.1.3 Waste Rock Disposal

Four waste rock disposal facilities were constructed in the Genesis-Bluestar Operations Area. The North and South Waste Rock Disposal facilities are no longer in use and are being reclaimed. Active deposition of waste rock is occurring in the Section 36 Waste Rock Disposal Facility. The Section 5 Waste Rock Disposal Facility is currently inactive and scheduled for reclamation, but would be expanded vertically under the Proposed Action.

Section 5 Waste Rock Disposal Facility

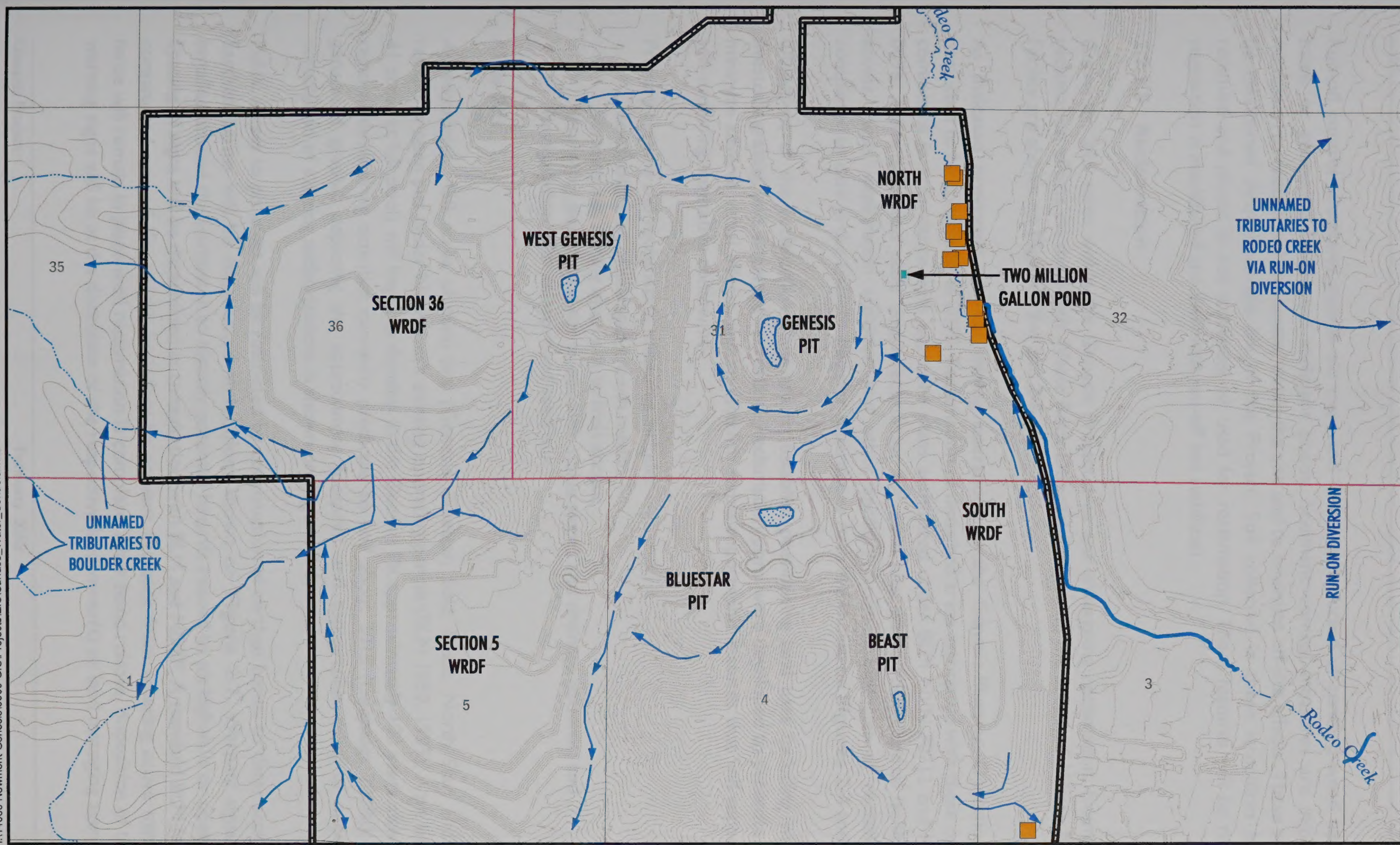
The Section 5 Waste Rock Disposal Facility is permitted for a surface disturbance of 340 acres. The existing facility was constructed at an elevation beginning at 5580 feet amsl extending to a maximum height of 5800 feet amsl. Overall dimensions of the facility are approximately 4,500 feet long by 3,200 feet wide. The lower-most lifts of waste rock in the Section 5 Waste Rock Disposal Facility have been reclaimed. To date, approximately 121Mt of waste rock (including 24.6Mt of PAG rock) have been placed in the facility.

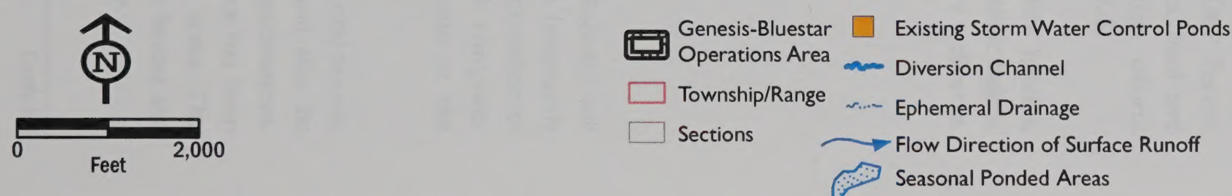
Section 36 Waste Rock Disposal Facility

The Section 36 Waste Rock Disposal Facility was constructed in accordance with the Plan of Operations Amendment, Blue Star Operations Area for the Section 36 Project Open Pit Mines and Waste Rock Disposal Facilities (Newmont 1994) and previously permitted for 330 acres with an average height of 220 feet (BLM 1995). Dimensions of the facility are approximately 4,800 feet in length by 4,200 feet in width. Toe elevation of the facility is approximately 5460 feet amsl. The Section 36 Waste Rock Disposal Facility is currently permitted to accept 103Mt of waste rock, including a PAG waste rock encapsulation cell; however, the PAG cell has not been constructed as of the date of this document. To date, approximately 42.6Mt of non-PAG waste rock has been placed in the facility.

2.2.1.4 Surface Water Control Structures

Surface water diversion channels and ditches have been constructed as necessary around surface facilities, mine pits, and waste rock disposal facilities to control storm water run-on to these sites (**Figure 2-3**). Surface water control ditches and sediment retention ponds have been constructed in accordance with Best Management Practices (BMPs) as outlined in the Handbook of Best Management Practices (Nevada State Conservation Commission 1994) and Newmont's Storm Water Pollution Prevention Plan. Sediment ponds and diversion ditches are sized to contain a 100-year/24-hour precipitation event of 2.8 inches. Run-on diversion channels and ditches will remain as permanent features after final reclamation and mine closure.





Surface Water Control Structures
Genesis Project
Eureka County, Nevada
FIGURE 2-3

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Run-off control structures include silt traps and fences constructed of certified weed free straw, hay bales, or geotextile fabric, and sediment ponds. Sediment control measures are implemented, as necessary, to reduce soil movement within the site and to minimize off-site effects. These structures will be maintained throughout the life of the Project. Soil collected in these structures is periodically removed and placed in soil stockpiles or used for reclamation. These features will be removed once vegetation is established and sediment run-off has stabilized.

2.2.1.5 Reclamation

Currently, 245 acres within the Genesis Project area are undergoing reclamation. Examples of these reclamation efforts on the South Waste Rock Disposal Facility and the Section 5 Waste Rock Disposal Facility are shown on **Figures 2-4** and **2-5**.

As indicated previously, current mining operations in the Genesis-Bluestar Operations Area are projected to be completed in 2010. Reclamation of disturbed areas associated with these operations will commence in accordance with approved plans authorized under BLM NVN-70712 and NDEP Permit 0096. These approved plans detail reclamation for mine pits, waste rock disposal facilities, haul and access roads, exploration activities, and other ancillary facilities. Examples of reclamation efforts completed to date in the Genesis-Bluestar Operations Area are shown on **Figures 2-4** and **2-5**.

Objectives of the reclamation plans are to establish post-mining land uses including wildlife habitat, livestock grazing, and dispersed recreation. Reclamation plans were developed to promote public safety, minimize adverse visual effects, and re-establish stable topographic features that will support a diverse, self-sustaining vegetative community.

Primary closure and reclamation measures include:

- Re-distribution of salvaged growth media;
- Berming and signing open pits to limit access;
- Regrading disturbed areas to establish stable slopes and drainage patterns; and
- Revegetation with an approved seed mix.

Mine Pits

Approximately 450 acres of mine pits (Genesis, Bluestar, Sold, Beast, North Star, and Bobcat) will remain as open pits under Newmont's existing operating permit (BLM 1989, 1995). A pit lake (ultimately 41 acres at full pool) will begin to develop in the Genesis Pit approximately 100 years after cessation of regional dewatering activities currently predicted to end about 2018 (Geomega 2008a). A computer generated graphic depicting the approximate footprint and topographic relief of mine pits at the completion of existing authorizations is shown on **Figure 2-6**.

Public access to pit areas will be restricted by construction of earthen berms to deter accidental access. Earthen berms will be constructed at locations shown on **Figure 2-7**. Warning signs will also be installed around the perimeter to identify potential hazards related to pit highwalls or open excavations. Spacing of signs will be determined in consultation with BLM and NDEP. A standard BLM fence has been constructed around the permit boundary to prevent livestock from entering active mine areas. The fence will remain in place until reclamation is complete. After bond release, disposition of the fences and warning signs will be at the discretion of the respective landowner(s) or land managing agency.

Growth Media

Following final grading, Newmont would redistribute approximately 622,000 cubic yards (cy) of growth media salvaged from previous mining operations in the area. Final reclaimed contours are shown on **Figure 2-7**. See **Figure 2-2** and **Table 2-1** for the location of stockpiles and quantities. Growth media would be placed up to six inches deep on selected areas and where sufficient fines are available on the surface of areas to be reclaimed, direct seeding would be conducted. Unused growth media will be stockpiled in three locations (see **Figure 2-2)**. GM-1 is located in the east-central portion of the Section 36 Waste Rock Disposal Facility (SW/SE/NE quarter of Section 36). GM-2 is located in the western side of the Section 36 Waste Rock Disposal Facility (E½/SE/NW quarter of Section 36). GM-3 is located on the northwest corner of the North Star Pit (SW/SE/SW quarter of Section 25).

TABLE 2-1
Growth Media
Existing Operations

Growth Media Stockpile	Volume (cy)
GM-1	199,000
GM-2	207,000
GM-3	216,000
TOTAL	**622,000**

Waste Rock Disposal Facilities

Approved reclamation plans for the Section 5 and Section 36 Waste Rock Disposal facilities include grading to establish final slopes at 2.5 Horizontal (H):1.0 Vertical (V). Grading would be done to minimize erosion, facilitate reclamation activities (e.g., seeding, mulching), and provide a surface to support vegetation.

Haul Roads and Ancillary Facilities

Roads associated with the Genesis-Bluestar Operations Area will be reclaimed concurrently with cessation of operations in individual areas. Roads remaining at the end of mining operations would be reclaimed when no longer needed for reclamation and access.

Haul roads linking mine pits with waste rock disposal areas will be reclaimed concurrently with closure of the respective disposal area. Haul roads not located on the waste rock disposal site will be reclaimed by regrading to provide proper drainage, ripping to reduce compaction, placement of growth media, seed-bed preparation, and seeding. Reclaimed roads will be regraded, to the extent practical, to reestablish original topography and drainage of the site and to control erosion. Culverts will be removed and natural drainage reestablished.

Upon cessation of mining activities, ancillary facilities including the explosives magazine, crusher, and other mine support structures with salvage value will be dismantled for salvage or used for other operations in the area. Concrete foundations will be broken up to the extent possible and buried, or left intact and buried beneath ten feet of fill material. These sites will be reclaimed by regrading to provide proper drainage, ripping to reduce compaction, placement of growth media, seedbed preparation, and seeding.

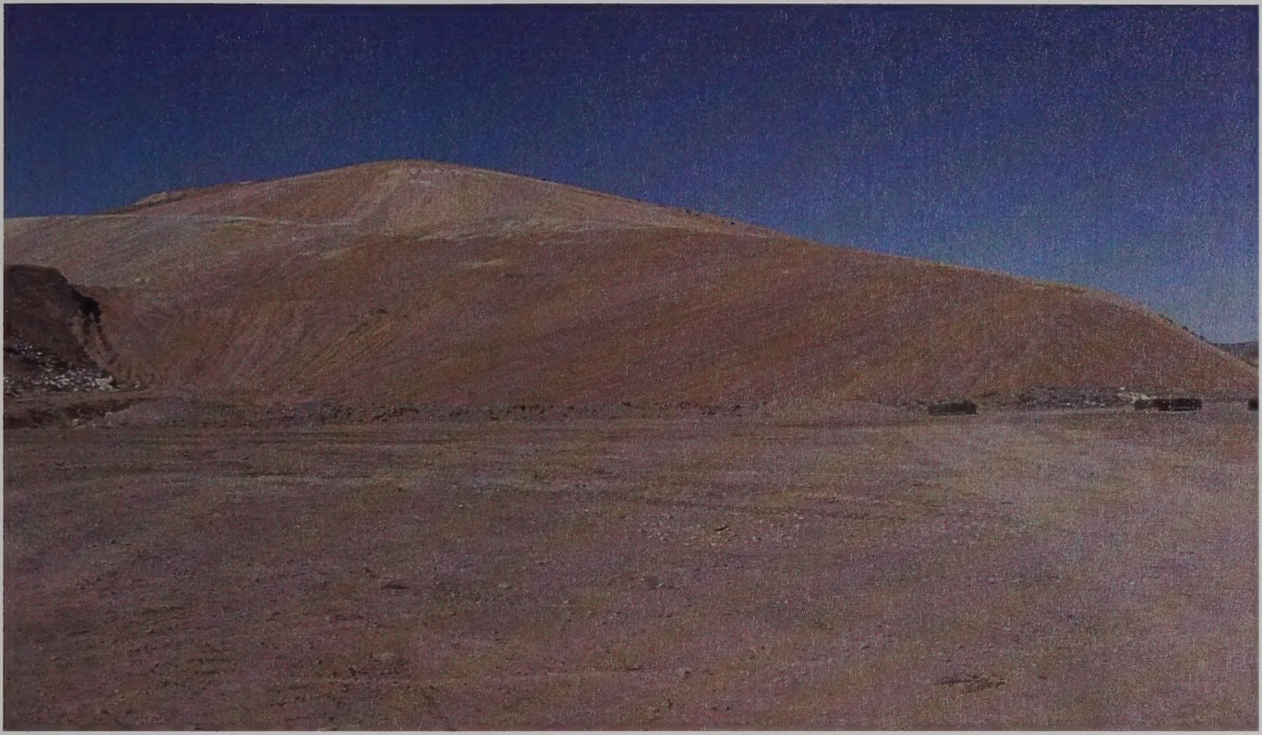


Photo No. 1 – Regraded/Recontourd Slopes in Genesis-Bluestar Operations Area

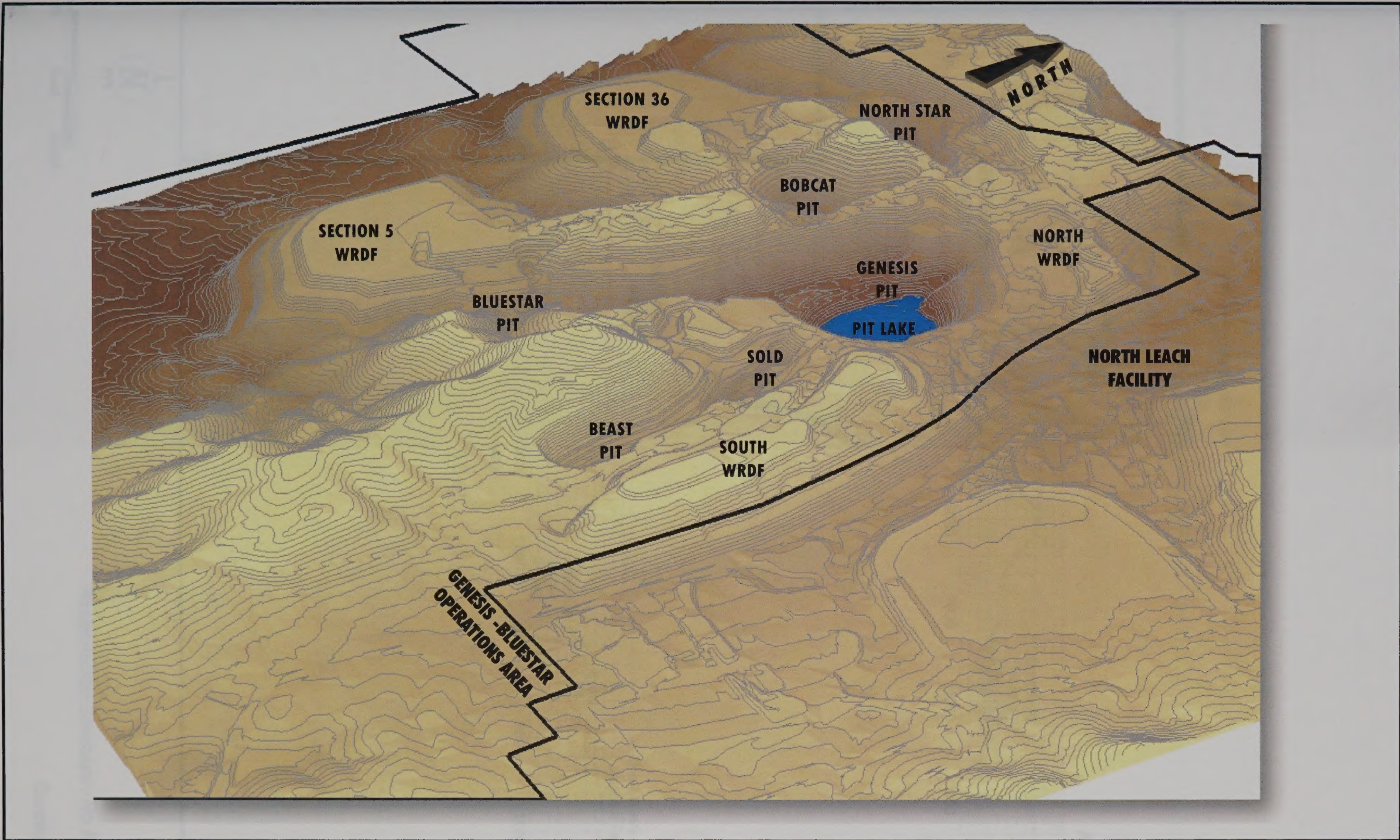
Photo No. 2 - Revegetated Slope in Genesis-Bluestar Operations Area (April 08)

FIGURE 2-4
South Waste Rock Disposal Facility Reclamation
Genesis Project

Plate 1 - Newmont - Section 5 WRDF - 2005 - Typical View Looking North

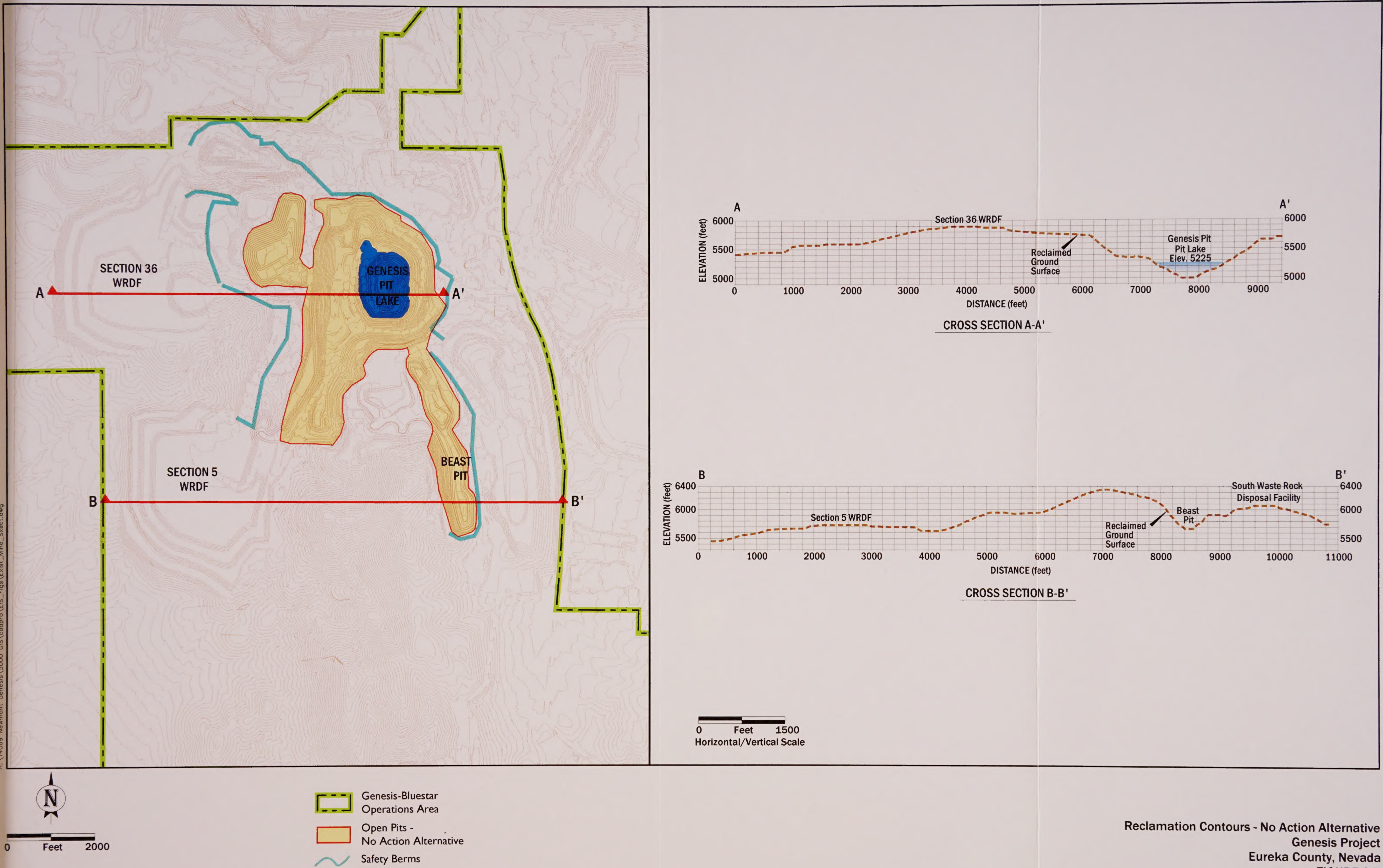
Plate 2 - Newmont - Section 5 WRDF - 2005 - Typical View Looking South

FIGURE 2-5
Reclamation of Section 5 Waste Rock Disposal Facility
Genesis Project



Not To Scale

Conceptual Topographic Relief
Existing Operations
Genesis Project
Eureka County, Nevada
FIGURE 2-6



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Reclamation Contours - No Action Alternative
Genesis Project
Eureka County, Nevada
FIGURE 2-7

2.2.1.6 Invasive, Non-native Species

Newmont conducts annual weed surveys to direct weed control efforts. Monitoring weed infestations and weed control are ongoing and will continue until reclamation is complete and potential for weed invasion is minimized. Since 2005, Newmont has treated approximately 5,500 acres for Scotch thistle, salt cedar (tamarisk), and hoary cress. Treatment areas ranged from the Bootstrap Mine in the north to the Rain Mine in the south (Basin Tree Service and Pest Control 2005, 2006, 2007, 2008). There was no treatment for invasive, non-native species in 2008. In 2009, approximately seven acres were treated for whitetop. Future treatment for invasive, non-native species is expected to be similar to previous years.

2.2.1.7 Employment

Newmont currently employs approximately 3,300 people at its operations in eastern Nevada. Of these, about 1,300 workers are employed at surface operations in the Carlin Trend. Most of the work force tasked to the Genesis – Bluestar Operations Area is from Newmont's existing mine-related work forces in the Carlin Trend. Upon completion of current mining and reclamation activities this work force would likely be shifted to other operations coming on line (e.g., Emigrant Project) or a work force reduction would occur.

2.2.2 FUTURE OPERATIONS FROM EXISTING AUTHORIZATIONS

2.2.2.1 Mining Operations

Mining operations that would occur for the remaining mine life under existing authorizations include continued mining of the Bobcat and a small portion of the Genesis-Bluestar pit. Mining in the Sold Pit will continue into 2010. Depending on gold prices, the Payraise Pit could also be developed during this period.

Existing mine pit excavations, conducted under existing authorizations, total approximately 450 acres. When mining under existing authorizations ceases, up to approximately 480 acres of pits will remain.

2.2.2.2 Ore Processing

Oxide ore produced from these mine pits is transported to Newmont's North Area Leach Facility. During the remaining mine life approximately 2.6Mt of run-of-mine oxide ore will be placed on the North Area Leach Facility. Newmont does not anticipate processing any oxide mill or refractory ore during the remaining mine life under authorized operations. Ore processing is described in Section 2.2.1.2 – Ore Processing above.

2.2.2.3 Waste Rock Disposal

Approximately 13Mt of waste rock from mining operations conducted through the remaining mine life under existing authorizations will be placed in the Section 36 Waste Rock Disposal Facility. Waste rock from the Sold Pit is used as backfill for underground operations at the Leeville Project. The Section 36 Waste Rock Disposal Facility is described in Section 2.2.1.3 – Waste Rock Disposal above.

2.2.2.4 Energy Use

Consumption of diesel fuel for ongoing Genesis-Bluestar operations are estimated at 370,000 gallons annually. Electrical power consumption associated with processing oxide leach ore at the North Area Leach Facility is approximately 13,200 megawatt hours (MWh) annually. All other aspects of operations will be similar to that described in Section 2.2.1 - Existing Operation.

2.2.3 AUTHORIZED OPERATIONS WHICH WOULD BE MODIFIED IF THE PROPOSED ACTION IS APPROVED

This section describes how existing authorizations would be impacted by approval of the Proposed Action described in Section 2.3. Modifications include the following:

2.2.3.1 Mine Pits

Approval of the Proposed Action would generate approximately 355Mt of waste rock for use as in-pit backfill of previously mined out pits (see Section 2.3.2 – Mining Operations). Waste rock from expansion of the Genesis Pit would provide in-pit backfill to completely fill the Bluestar and Beast pits. In-pit backfill would also be used to partially fill mined out portions of the Genesis Pit eliminating formation of a pit lake. A net increase of approximately 300 acres of backfilled mine pits would be reclaimed to provide a land surface capable of supporting wildlife habitat and livestock grazing. Approximately 124 acres of highwall (25,000 linear feet) ranging in elevation from 5310 feet amsl to 5850 feet amsl would remain as shown on **Figure 2-7**.

2.2.3.2 Waste Rock Disposal Facilities

Under the Proposed Action, the Section 5 and Section 36 Waste Rock Disposal facilities would be vertically extended approximately 160 feet and 100 feet, respectively (see Section 2.3.5 – Waste Rock Management). No new surface disturbance would be required beyond the current permitted footprint. Newmont would conduct concurrent reclamation activities to the extent practicable. Reclamation would be conducted on facilities or portions of these facilities that have been constructed to design limits. Reclamation of these facilities would be delayed until the end of mining operations and placement of waste rock is completed.

2.2.3.3 Reclamation

Under the Proposed Action, reclamation of existing disturbance, including haul roads and other disturbance within the operations boundary as well as off-site facilities such as the North Area Heap Leach, may be delayed for up to twelve years.

2.2.3.4 Employment

Newmont currently employs approximately 200 workers in the Genesis-Bluestar Operations Area. Rather than be laid off or reassigned to other projects, these workers would continue work at the Genesis Project and be joined by additional workers. An average of 687 workers would be employed during the twelve-year mine life. The proposed Genesis Project would not result in hiring new employees, but would extend the employment of Newmont's existing Carlin work force.

2.3 PROPOSED ACTION

The Proposed Action referred to throughout this EIS is Newmont's proposed amendment (Newmont 2007a) to the Genesis-Bluestar Plan of Operations under BLM authorization NVN - 70712 and NDEP Permit No. 0096. Components of the Proposed Action are shown on **Figure 2-8.**

The Proposed Action includes the following activities:

- Expansion of the existing Genesis Pit (within the existing permitted disturbance area);
- Placement of waste rock generated from expansion of the Genesis Pit as in-pit backfill in the previously depleted Beast, Bluestar, and mined-out portions of the Genesis Pit;
- Elimination of a pit lake in Genesis Pit as a result of partial backfill of the pit;
- Development and operation of the Bluestar Ridge Pit and construction of an associated haul and access road;
- Installation of up to 35 drains and ten wells to dewater isolated groundwater zones in the Genesis Pit east highwall;
- Vertical expansion of the Section 36 Waste Rock Disposal Facility and construction of an associated haul and access road;
- Vertical expansion of the Section 5 Waste Rock Disposal Facility; and
- Reclamation of areas disturbed by mining activities.
- Continued employment for mining in the Elko area.
- Classification and management of waste rock to prevent Acid Rock Drainage, including an Adaptive Management Plan to provide for supplemental testing and modified classification and management if determined to be necessary as a result of the supplemental testing.

During the review process the following modifications to the proposed Plan of Operations Amendment have been coordinated with NDEP and BLM and adopted by Newmont:

- Waste Rock Management Plan;
- Adaptive Management Plan for Waste Rock (**Appendix A**);
- Modifications to final reclamation contours on waste rock disposal facilities; and
- Haulage of Tertiary Carlin Formation material from the East Lantern Waste Rock Disposal Facility for use as growth media in the Genesis Project area.

Proposed areas of new disturbance within the Genesis-Bluestar Operations Area are listed in **Table 2-2**. Under existing authorizations, the reclaimed use of the Beast, Bluestar, and Genesis pits would remain as open mine pits. Implementation of the Proposed Action would result in backfilling these pits and therefore conversion to waste rock disposal facilities. Subsequent regrading and revegetation of these backfilled pits would change the reclamation to that capable of supporting wildlife habitat and livestock grazing. New disturbance and existing disturbed areas that would be redisturbed are listed in **Table 2-2** and shown on **Figure 2-8**.

For the purposes of this EIS, the new surface disturbance (43 acres) consists of 36 acres of undisturbed ground and 7 acres of exploration roads and drill pads constructed under previous authorization in the proposed Bluestar Ridge Pit area.

TABLE 2-2
Proposed New Disturbance and Change in Existing Disturbance Areas (acres)
Genesis Project

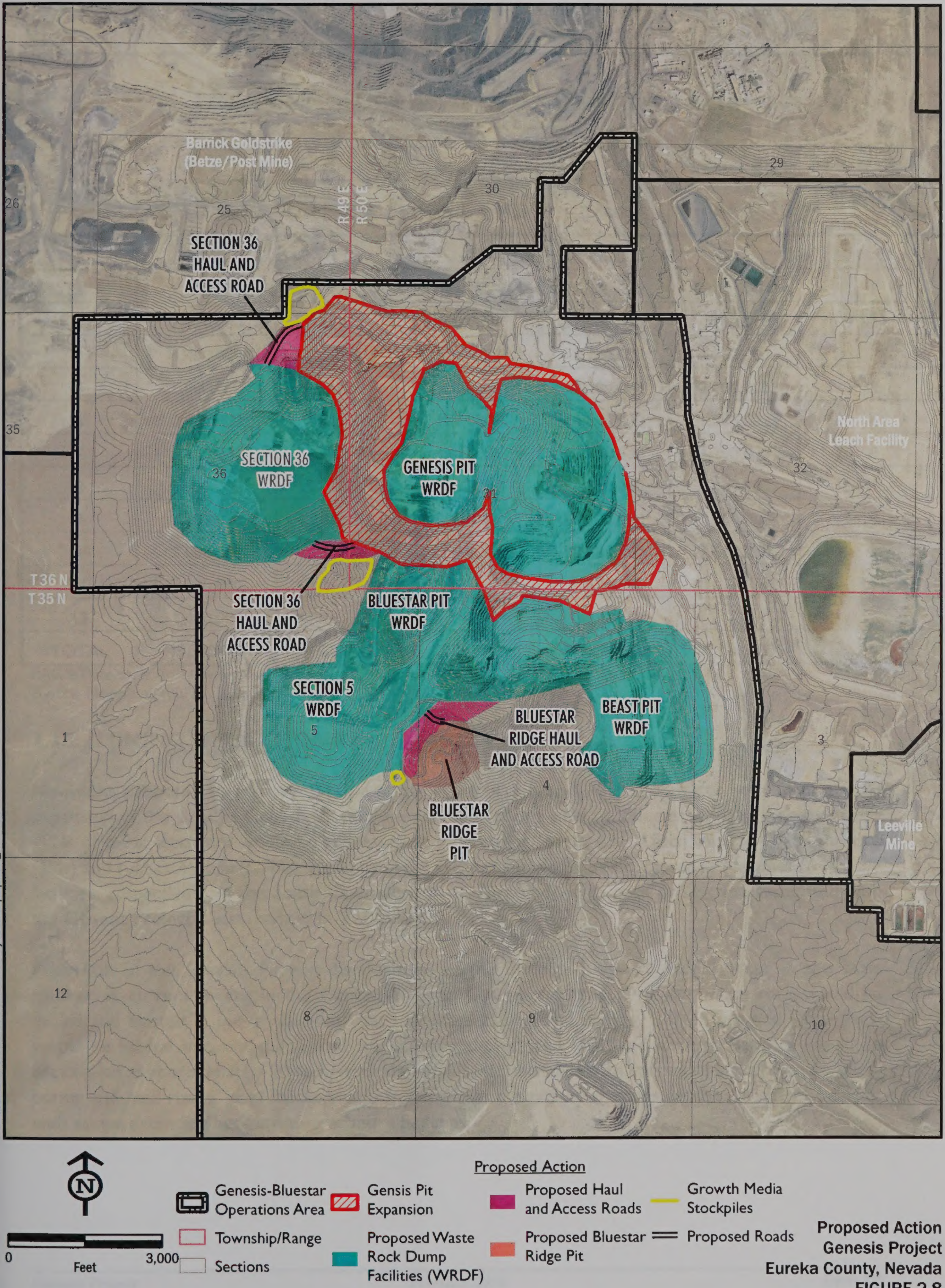
Facility	Existing Disturbance/ Permitted Reclamation	New Disturbance[1]	Change in Existing Disturbance Area[2]		
			Highwall	Open Pit	Revegetated[3]
Section 5 WRDF	139/ WRDF				139
Section 36 WRDF	227/WRDF				227
Beast Pit	195/Open Pit	1			196/WRDF
Bluestar Pit	178/Open Pit	8			187/WRDF
Genesis Pit	319/Open Pit		124		195/WRDF
Bluestar Ridge Pit		26		26	0
Bluestar Ridge Haul Road	11	8			19
Section 36 Haul Road	22				22
Total	1135	43	124	26	985

WRDF = Waste Rock Disposal Facility
[1] Within existing Genesis-Bluestar Operations Area
[2] Change in status of reclamation in existing disturbance.
[3] Area to be covered with two feet of growth media (Carlin Formation or existing stockpiled material) and seeded.
Source: Newmont 2007a.

The Proposed Action would modify the existing approved reclamation and closure plan resulting in backfill of mined-out pits with waste rock generated from expansion of the Genesis Pit. Waste rock generated during expansion of the Genesis Pit would provide approximately 355Mt of waste rock for use as in-pit backfill to completely fill the previously depleted Bluestar and Beast Mine pits. In-pit backfill would also be used to partially fill mined out portions of the Genesis Pit eliminating formation of a pit lake. Disposal of waste rock in this manner would reduce the amount of land in the Genesis-Bluestar Operations Area that would remain as open pits (from approximately 450 acres to 150 acres) under previously approved permits.

2.3.1 LIFE-OF-MINE SCHEDULE

Under current operating plans and projections, Newmont anticipates the Genesis Project would have an operational mine life of twelve years. Reclamation, closure, and monitoring activities could extend 30 years beyond cessation of active mining. Ore and waste rock production over the life-of-mine operation is shown in **Table 2-3**.



Proposed Action
Genesis Project
Eureka County, Nevada
FIGURE 2-8

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TABLE 2-3 Proposed Life-of-Mine Ore and Waste Rock Production (tons) Genesis Project						
Year	Ore			Waste Rock		
	Oxide Leach	Oxide Mill	Refractory Mill	Total	PAG	% PAG of Total
1	300,000	-	-	19,700,000	-	-
2	1,600,000	-	-	38,400,000	200,000	1
3	2,500,000	100,000	100,000	37,300,000	700,000	2
4	4,400,000	600,000	1,300,000	43,700,000	2,900,000	7
5	1,900,000	800,000	1,600,000	12,200,000	2,000,000	16
6	2,600,000	100,000	100,000	46,600,000	1,900,000	4
7	6,400,000	300,000	100,000	53,200,000	4,200,000	8
8	8,900,000	500,000	300,000	50,300,000	5,900,000	12
9	7,700,000	1,300,000	900,000	88,300,000	7,700,000	9
10	7,600,000	1,300,000	2,300,000	50,800,000	2,600,000	5
11	3,000,000	-	-	7,200,000	-	-
12	1,400,000	-	-	1,800,000	-	-
TOTAL	48,300,000	5,000,000	6,700,000	449,500,000	28,100,000	6

PAG = Potentially Acid Generating
Source: Newmont 2007a.

2.3.2 MINING OPERATIONS

Newmont proposes to remove approximately 60Mt of ore and 450Mt of waste rock from phased expansion of the existing Genesis Pit and development of one new pit (Bluestar Ridge). Approximately 48Mt of oxide leach ore would be processed at the existing North Area Leach Facility. Oxide mill ore (5Mt) and refractory ore (6.7Mt) mined from the Genesis Pit would be processed at Newmont's Mill 5/6 facilities, respectively, in the South Operations Area. Ore and waste rock production associated with the Genesis Project is summarized in **Table 2-4**.

Expansion of the Genesis Pit and development of the Bluestar Ridge Pit would occur in the same manner as current mining in the Genesis-Bluestar Operations Area. Ore and waste rock would be drilled and blasted in sequential benches to facilitate loading and hauling. Blasted ore and waste rock would be loaded into end-dump haul trucks using shovels and front-end loaders. Benches would be established at approximately 20-foot vertical intervals with bench widths varying to accommodate safety berms and haul roads. Haul trucks would move within the pits using roads on the surface of benches with ramps extending between two or more benches.

<table>
<tr><th colspan="5">TABLE 2-4
Proposed Ore and Waste Rock Production and Disposition
Genesis Project</th></tr>
<tr><th colspan="5">Production – Genesis Project</th></tr>
<tr><th rowspan="2">Mine Pit</th><th colspan="2">Ore (million tons)</th><th colspan="2">Waste Rock (million tons)</th></tr>
<tr><th>Oxide Leach</th><th>Mill 5/6</th><th>PAG</th><th>Non-PAG</th></tr>
<tr><td>Genesis Pit</td><td>43.9</td><td>11.7</td><td>28.1</td><td>412.4</td></tr>
<tr><td>Bluestar Ridge Pit</td><td>4.4</td><td>-</td><td>-</td><td>9.0</td></tr>
<tr><td>Subtotal</td><td>48.3</td><td>11.7</td><td>28.1</td><td>421.4</td></tr>
<tr><td>TOTAL</td><td colspan="2">60</td><td colspan="2">449.5</td></tr>
<tr><th colspan="5">Waste Rock Disposal – Genesis Project</th></tr>
<tr><td>Site</td><td colspan="2">PAG (million tons)</td><td colspan="2">Non-PAG (million tons)</td></tr>
<tr><td rowspan="2">Beast Pit</td><td>Cell 1</td><td>0.8</td><td colspan="2" rowspan="2">91.6</td></tr>
<tr><td>Cell 2</td><td>3.0</td></tr>
<tr><td>Bluestar Pit</td><td></td><td>-</td><td colspan="2">46.5</td></tr>
<tr><td rowspan="3">Genesis Pit</td><td>Cell 1</td><td>6.8</td><td colspan="2" rowspan="3">194.3</td></tr>
<tr><td>Cell 2</td><td>11.0</td></tr>
<tr><td>Cell 3</td><td>0.4</td></tr>
<tr><td>Section 5 Waste Rock Disposal Facility</td><td></td><td>3.0</td><td colspan="2">38.7</td></tr>
<tr><td>Section 36 Waste Rock Disposal Facility</td><td></td><td>3.1</td><td colspan="2">50.3</td></tr>
<tr><td colspan="2">Subtotal</td><td>28.1</td><td colspan="2">421.4</td></tr>
<tr><td colspan="2">TOTAL</td><td colspan="3">449.5</td></tr>
</table>

PAG = Potentially Acid Generating.
Source: Newmont 2007a.

Drill cuttings would be collected during blast-hole drilling and analyzed to determine gold content and metallurgical and waste rock characteristics. Blasted waste rock material would be separated as PAG or non-PAG and loaded into haul trucks for transportation to a waste rock disposal facility or placed as in-pit backfill in mined-out pits.

2.3.2.1 Genesis Pit

Proposed activity at the Genesis Pit would result in expansion of the current pit to overall dimensions of 6,300 feet in length by 4,400 feet in width (**Figure 2-8**). The depth of the pit would be increased by 360 feet to an elevation of approximately 4620 feet amsl. Development and operation of the Genesis Pit would occur within areas previously disturbed by mining activities, including the Bobcat and Sold pits.

2.3.2.2 Bluestar Ridge Pit

The proposed Bluestar Ridge Pit would be developed on seven acres of private land and 19 acres of public land (**Figure 2-8**). Approximately seven acres within the proposed footprint of the mine pit have been disturbed by exploration activities (roads and drill pads). The Bluestar Ridge Mine is the least economical of all proposed mining activity and would be the last site to be developed. Backfill (or partial backfill) would not be feasible due to the size, geometry, and location of ore in the pit. Most of the lower benches of the Bluestar Ridge Pit are comprised of ore and contain minor amounts of waste rock. Any backfilling of the Bluestar Ridge Pit would require rehandling of waste rock and therefore, would not be economical. Ore and waste rock production associated with the Bluestar Ridge Pit is summarized in **Table 2-4**. All waste rock (approximately 9Mt) generated from the Bluestar Ridge Pit would be placed in the Section 5 Waste Rock Disposal Facility. No PAG waste rock would be generated from this mine pit.

The Bluestar Ridge Pit would extend approximately 1,300 feet in length, 1,400 feet in width, and approximately 600 feet in depth to an elevation of 5340 feet amsl. Elevation of the pit bottom would not intercept baseline groundwater level (5265 feet amsl) precluding formation of a pit lake. Dewatering would not be required for the Bluestar Ridge Pit.

2.3.3 ORE PROCESSING

Oxide leach ore (approximately 48Mt) from the Genesis Pit would continue to be processed at the North Area Leach Facility located approximately one mile east of the Genesis Pit. Low grade oxide leach ore would be hauled to the leach pad as run-of-mine material, while higher grade oxide leach ore may be crushed at the North Area Leach crusher prior to placement on the leach pad. The North Area Leach Facility is located on private land controlled by Newmont. The leach facility covers approximately 507 acres (**Figure 2-8**). NDEP approved Phase VII and VIII expansions of the North Area Leach would provide sufficient capacity (approximately 50Mt) to process ore produced under the Proposed Action.

Approximately 5Mt of oxide mill ore and 6.7Mt of refractory mill ore would be processed at Newmont's Mill 5/6 complex located in the South Operations Area. Oxide and refractory mill ore would be hauled to the South Operations Area via the North/South Haul Road or travel in highway ore trucks along State Route 766 to the South Operations Area gate.

Refractory ore encountered during the Proposed Action may be temporarily stockpiled at the existing Section 3 stockpile area for future processing at Mill 6. This stockpile would be periodically hauled to the South Operations Area for ore processing as the mill feed demands.

Tailings generated from processing 11.7Mt of oxide and refractory ore from the Genesis Project would be placed in the Mill 5/6 Tailings Storage Facility (TSF) located at Newmont's South Operations Area. The Mill 5/6 TSF is permitted under NDEP Water Pollution Control Permit NEV 00950056 to accommodate up to 135Mt of tailings.

2.3.4 MINE PIT DEWATERING

The Gen Fault transects the Genesis Pit from north to south. The portion of the mine pit lying west of the Gen Fault (carbonate rocks) is within the groundwater cone-of-depression (approximately 4175 feet amsl) created from ongoing dewatering activities at Barrick's Betze/Post Mine and Newmont's Leeville Mine and, therefore, would not require additional dewatering (**Figure 2-9**).

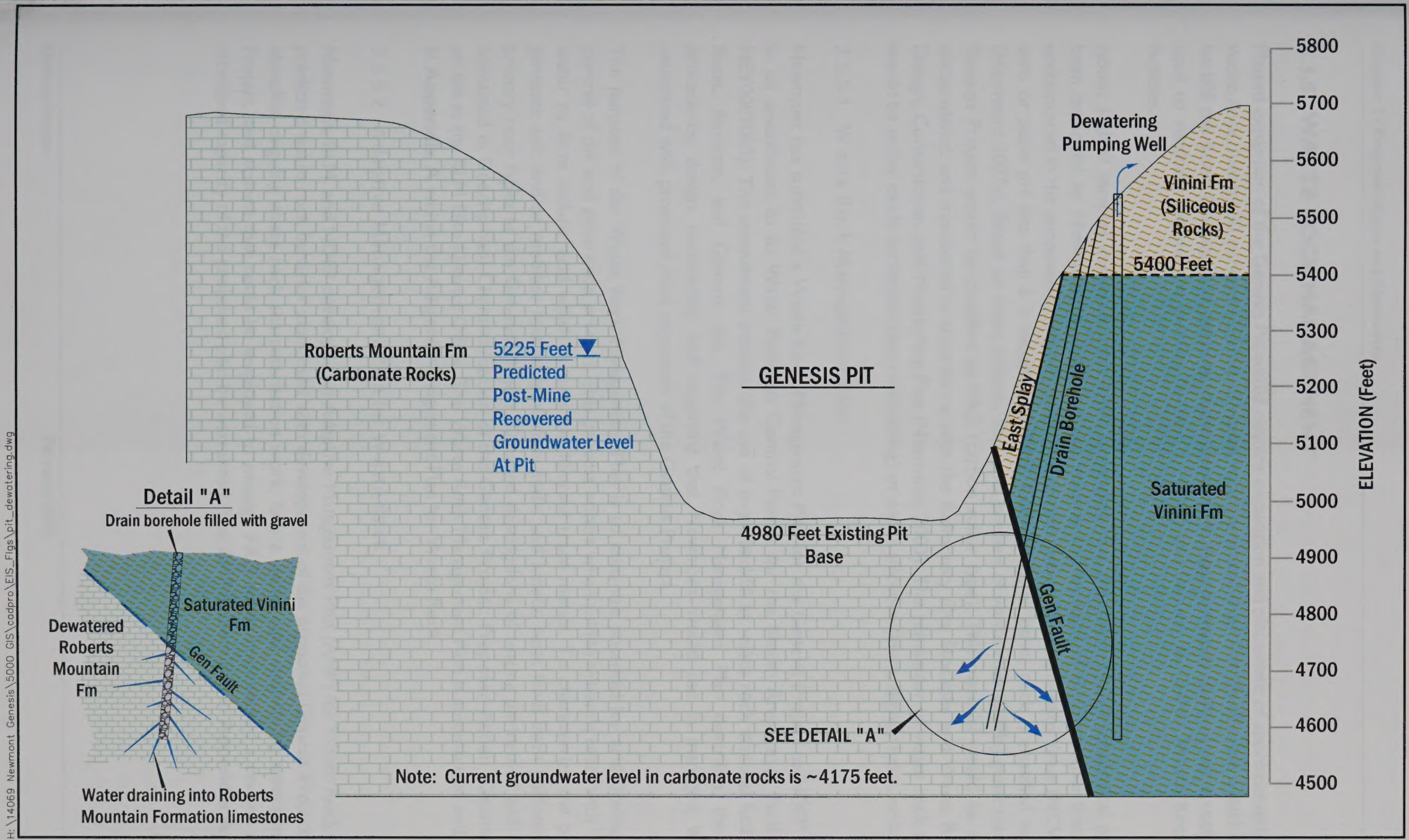
Groundwater east of the Gen Fault is in siliceous rocks of the Vinini Formation, which has lower permeability than the carbonate rocks on the west side of the fault. This condition results in a local groundwater system in the siliceous rocks that is not connected hydraulically to the carbonate aquifer. The current groundwater level in siliceous rocks east of the Gen Fault is approximately 5400 feet amsl, compared to 4175 feet amsl in carbonate rocks west of the Gen Fault. Groundwater east of the Gen Fault would require dewatering prior to mining.

Dewatering groundwater in the siliceous rocks east of the Gen Fault would occur in stages. The first stage would involve construction of six or seven drain boreholes, and several pumping wells. Drain boreholes can be drilled as vertical, angle, and/or horizontally which would allow the isolated groundwater to drain into adjacent carbonate rock previously dewatered (west of Gen Fault). The proposed drains are anticipated to function for several months. Pumping wells would then be installed to remove groundwater remaining in zones not removed via drain boreholes.

Data obtained from the drain boreholes and pumping wells would assist in defining permeability of the rocks. This information would direct the next stage of dewatering, which would likely involve construction of additional drain boreholes and pumping wells. Currently, up to 35 drains and ten wells are planned to dewater the east highwall area. New pumping wells, eight to 14 inches in diameter and ranging from 800 to 1,000 feet in depth, would be constructed east of the mine pit edge. Dewatering wells would combine to pump up to an estimated 250 gpm to allow the expanded Genesis east highwall to be safely constructed. Actual number of wells and drains may be modified as dewatering experience is gained.

Water produced from pumping would be transported via a new surface pipeline to the existing Two Million Gallon Pond located east of the Genesis Pit adjacent to the crusher site (**Figure 2-2**). From there, water would be distributed through existing buried pipelines to Newmont's North Area Leach operations, Barrick's processing facilities, and to the Deep Post/Deep Star underground mining operation. Water produced via drains would infiltrate into permeable, dewatered carbonate rock beneath the Genesis Pit (**Figure 2-9**).

All drain boreholes and wells would be permitted by the Nevada State Engineer. At the end of operational life, the boreholes and wells would be plugged and abandoned in accordance with Nevada regulations, which are intended to ensure that abandoned boreholes and wells do not degrade waters of the State of Nevada.



Not To Scale

Mine Pit Dewatering Schematic and Cross Section
Genesis Project
Eureka County, Nevada
FIGURE 2-9

2.3.5 WASTE ROCK MANAGEMENT

Phased expansion of the Genesis Pit would require excavation and placement of approximately 450Mt of waste rock. Nearly 80 percent (355Mt) of waste rock generated over the life-of-mine would be used to backfill the Beast, Bluestar, and portions of the Genesis Pit. Approximately 95Mt of waste rock would be used to vertically expand the existing Section 5 (41Mt) and Section 36 (54Mt) Waste Rock Disposal facilities.

About 15,000 samples collected from 3,400 boreholes that described 17,000 lithological points have been evaluated by Newmont to determine the volume and location of PAG material that would be encountered in the proposed Genesis Project. Waste rock with a Net Carbonate Value (NCV) less than zero or paste pH less than 6 is classified as PAG. Conversely, all other rock is classified as non-PAG (Newmont 2007a). Based on these criteria, about six percent of waste rock (28Mt) generated from the Genesis Project would be classified as PAG (carbon sulfur type). This material would be segregated, encapsulated, and monitored in accordance with the Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan (Newmont 2003). The remainder of waste rock (non-PAG) would be either oxide carbonate (net neutralizing) or oxide siliceous (inert, slightly basic, or basic).

2.3.5.1 Waste Rock Management Plan

Newmont has submitted a Waste Rock Management Plan for the Genesis Project to NDEP for review as an amendment to its Water Pollution Control Permit for the North Area Leach Facility (WPCP NEV0087065). The amendment includes the use of in-pit backfill as waste rock disposal facilities in the Beast, Bluestar, and Genesis pits. The Waste Rock Management Plan describes the methods, procedures, design, monitoring, and reporting that Newmont would use in managing waste rock associated with proposed mine expansion of the Genesis Project.

The purpose of the Waste Rock Management Plan is to minimize potential for acid drainage through control of the acid generation process. This process occurs when sulfide minerals react with oxygen and water to form sulfuric acid which in turn can liberate trace metals. To characterize the potential to generate acid and/or mobilize metals, numerous static and kinetic tests have been performed on the primary rock types at the Genesis Project. Detailed descriptions of testing performed and results are contained in Geochemical Characterization of the Genesis Project: Proposed Action (Geomega 2008b) on file at the BLM Elko District Office. The Waste Rock Management Plan is summarized and presented in **Appendix A** within the Adapted Management Plan for Waste Rock.

2.3.5.2 Adaptive Management Plan for Waste Rock

Newmont, BLM, and NDEP developed an Adaptive Management Plan (AMP) for Waste Rock to confirm predicted waste rock behavior associated with development of the proposed Genesis Project. The AMP identifies ongoing waste rock characterization work, future waste rock monitoring associated with the Project, and actions that could be employed to manage PAG waste rock should a revised method or increased capacity of the proposed plan be warranted. The AMP is contained in **Appendix A.**

Supplemental rock characterization and confirmation testing associated with the AMP would be completed within the first year of the Genesis Project. Should results of the testing indicate implementation of a revised PAG management method, Newmont would initiate the revised material handling scheme in accordance with the AMP. If supplementary testing indicates there is more than 128 Mt of PAG, the project may be put on hold, if necessary, to prepare adequate engineering designs for the additional PAG material. The AMP provides for management of up to 100Mt of additional PAG material.

After completion of supplemental waste rock testing, waste rock monitoring would revert to the Genesis Project Waste Rock Management Plan, which is a component of Newmont's North Area Leach Operations Water Pollution Control Permit. The Waste Rock Management Plan would be continued throughout the life of the mine once the AMP is completed.

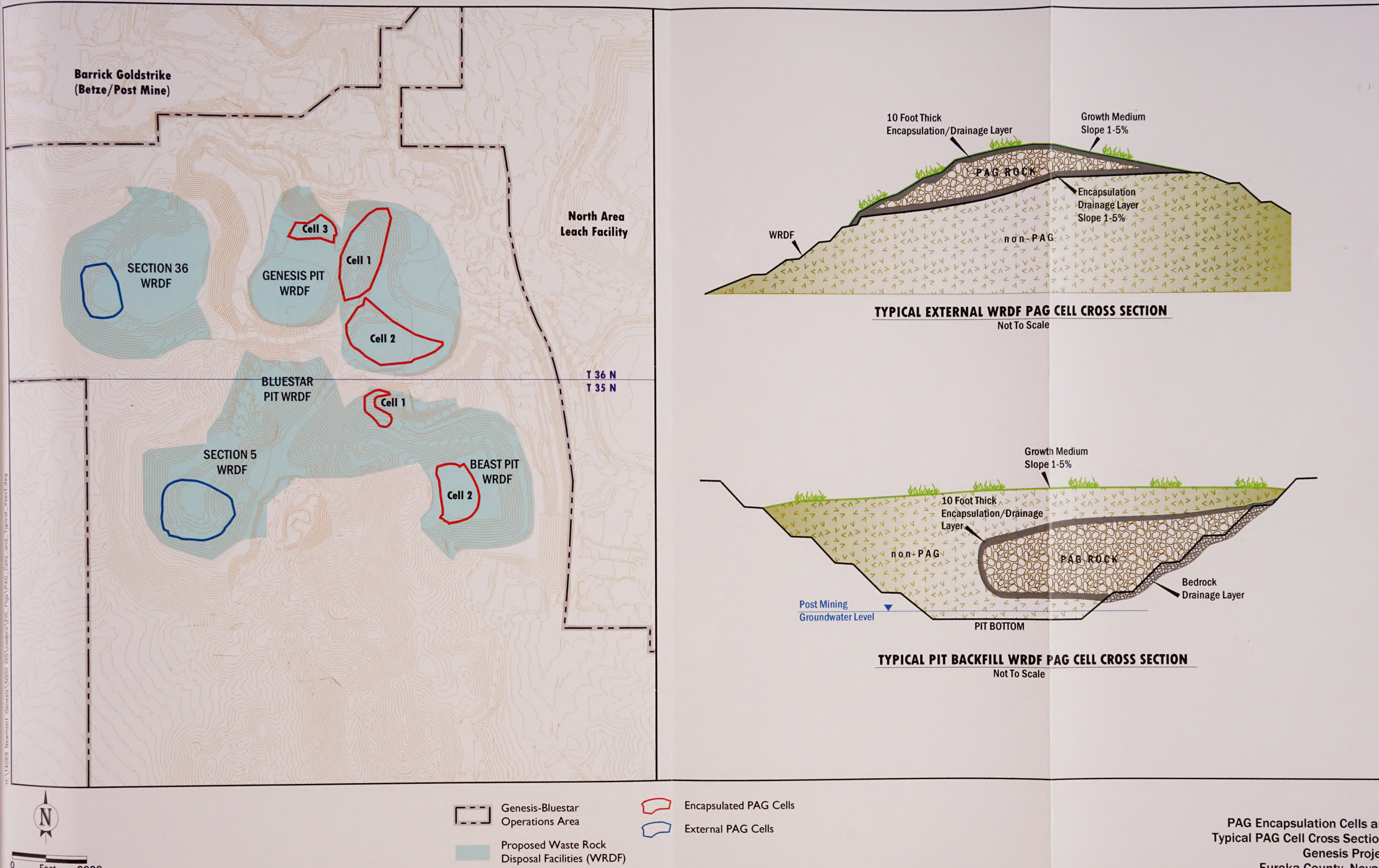
2.3.5.3 PAG Encapsulation Cells

PAG waste rock would be managed by encapsulation in backfilled pits and existing external waste rock disposal facilities. Current design includes construction of seven PAG cells (five cells in backfilled pits and two cells in existing external waste rock disposal facilities). Non-PAG rock would be placed in the bottom portion of each pit to a level above the predicted elevation of the post-mining groundwater level. Groundwater is predicted to rebound to an elevation of 5225 feet amsl in the backfilled portion of the Genesis Pit. This elevation is ten-feet higher than will form under the No Action Alternative due to evaporative loss from the pit lake.

PAG rock would be placed in select locations above the recovered water table elevation and on either limestone benches of the mine pit and/or on non-PAG backfill (**Figure 2-10**). Encapsulation material (rock with an acid neutralizing potential (ANP) to acid-generating potential (AGP) ratio ≥ 3:1) would be placed above and on the sides of the PAG rock cell to a minimum thickness of ten-feet to complete the encapsulation design. In circumstances where PAG would be placed directly on limestone benches within mined-out pits, Newmont would drill, blast, and dozer rip the surface of the limestone prior to placement of PAG. Placement of Encapsulation material and/or treatment of limestone benches surrounding PAG waste rock in the mined-out pits would promote diversion of meteoric water away from the compacted PAG waste rock. The drainage layer would minimize the amount of meteoric water that contacts PAG waste rock thereby minimizing release of contaminants.

Vertical expansion of the Section 5 and Section 36 Waste Rock Disposal facilities includes construction of PAG cells within non-PAG waste rock. PAG waste rock would be placed on non-PAG rock with a minimum ten-foot thickness of Encapsulation material (ANP:AGP ≥ 3:1) surrounding the sides, top, and bottom of the cells. Reclamation of the waste rock disposal facilities would include placement of two feet of growth media, grading to eliminate ponding areas, and establishing vegetation to minimize water infiltration.

The ratio of non-PAG to PAG waste rock averages 15:1 across all phases of mining at the Genesis Project. Design capacity of encapsulation cells is 31.4Mt of PAG waste rock; 3.3Mt more capacity than the amount of PAG rock projected to be mined. PAG cells would have a maximum of 25 acres of exposed PAG material at any time during the operational life of the Project.



PAG Encapsulation Cells and
Typical PAG Cell Cross Sections
Genesis Project
Eureka County, Nevada
FIGURE 2-10

2.3.5.4 Waste Rock Disposal Facilities

Newmont proposes to place waste rock excavated during the Genesis Project into the following disposal facilities:

- Beast Pit (includes Sold Pit);
- Bluestar Pit;
- Genesis Pit (includes Bobcat Pit);
- Section 5 Waste Rock Disposal Facility; and
- Section 36 Waste Rock Disposal Facility.

In-Pit Backfill

Backfilling mined-out pits listed above would occur through direct haul of waste rock from active mining operations. In some cases, mine pits would be backfilled to above grade (above current pit rim elevation), and in other cases mine pits would be partially backfilled. Waste rock placed as in-pit backfill would be confined by pit walls buttressing edges of waste rock backfill. Only non-PAG waste rock would be placed below the predicted post-mining groundwater elevation (5225 feet amsl).

PAG cells located below grade within mine pits would be constructed as described in Section 2.3.5.3 – PAG Encapsulation Cells. Individual mine pit backfill descriptions follow.

<u>Beast Pit</u>

Use of the mined-out Beast Pit as a waste rock disposal facility would require one acre of new surface disturbance on public land administered by BLM. The Beast Pit has capacity to store approximately 95Mt of waste rock that would be produced during expansion of the Genesis Pit. Waste rock would completely fill the pit to a maximum elevation (6260 feet amsl) approximately 340 feet above the existing pit crest (5920 feet amsl). Total fill would be approximately 720 feet thick at the deepest point.

Two PAG encapsulation cells would be constructed in the Beast Pit to accommodate a total of up to 3.8Mt of PAG rock (**Figure 2-10**). Groundwater elevation in the area prior to dewatering activities was 5265 feet amsl. Non-PAG waste rock would be used to backfill the Beast Pit to an elevation of 5730 feet amsl (approximately 500 feet above the original water table elevation) where construction of PAG Cell 1 would begin. PAG Cell 1 would be constructed on limestone host rock benches to an overall thickness of about 100 feet by 700 feet in length and 400 feet in width. Cell 1 would have capacity of 0.8Mt for PAG material.

PAG Cell 2 in the Beast Pit would be constructed at an elevation of approximately 6030 feet amsl, which is 765 feet above the original groundwater table (5265 amsl). PAG Cell 2 would be approximately 1,300 feet in length, 900 feet in width, and an average thickness of 120 feet, with a capacity to store 3Mt of PAG waste rock. This PAG cell would be constructed over non-PAG waste rock, as well as mine pit benches constructed in limestone.

Bluestar Pit

Development of the Bluestar Pit for waste rock disposal would require disturbance of four acres of private land and four acres of public land administered by BLM. A total of 46.5Mt of non-PAG waste rock from expansion of the Genesis Pit would be placed as backfill in the Bluestar Pit. The bottom of the Bluestar Pit would be 360 feet below ground surface at 5320 feet amsl. The proposed in-pit backfill would completely fill the pit and extend an additional 440 feet above ground level to an approximate height of 6120 feet amsl.

Genesis Pit

Waste rock disposal in the Genesis Pit would not require any new surface disturbance. Approximately 212Mt of waste rock generated during later phases of pit expansion would be placed in mined-out portions of the Genesis Pit. Waste rock placed as backfill would slope from elevation 5370 feet amsl on the west side of the pit up to about 5650 feet amsl at the east edge of the pit (**Figure 2-11**). Three PAG cells would be developed during construction of the disposal facility (**Figure 2-10**).

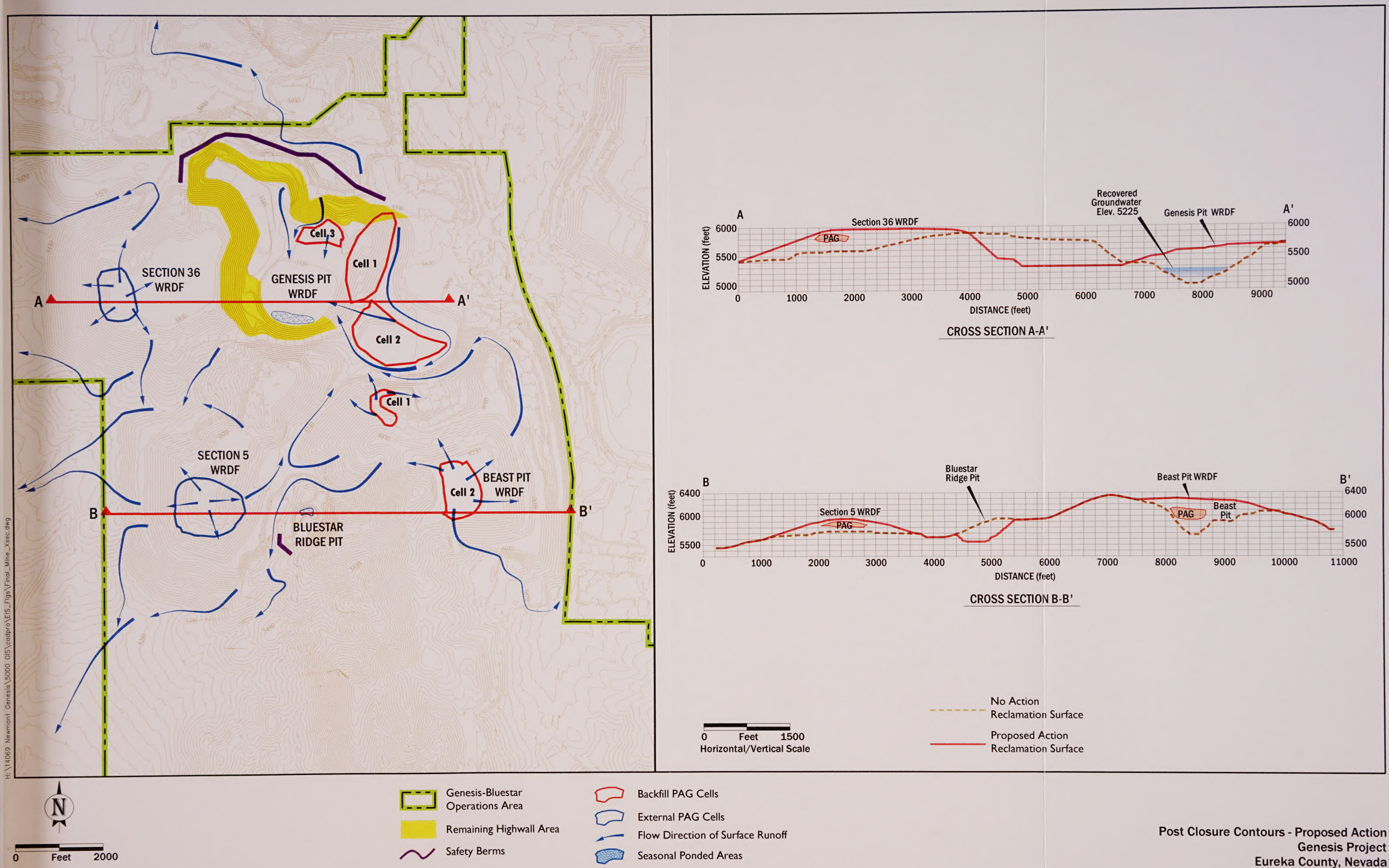
Non-PAG waste rock would be placed in the pit up to an elevation of 5280 feet amsl. Construction of Genesis PAG Cell 1 would begin west of the Gen Fault at a bottom elevation of 5280 feet amsl, approximately 55 feet above the predicted post-mining groundwater (recovered) water elevation of 5225 feet amsl. The cell would be approximately 2,000 feet long, 800 feet wide, and 100 feet thick, with a design capacity of approximately 7Mt. Cell 1 would be constructed over carbonate-rich waste rock and limestone host rock.

Construction of Genesis PAG Cell 2 would begin at an elevation of 5420 feet amsl (approximately 155 feet above the original water table elevation) and extend 1,100 feet in length, 2,000 feet in width, with an average thickness of 140 feet. Design capacity of Cell 2 is 13Mt. Approximately 11Mt of PAG waste rock from expansion of the Genesis Pit would be placed in this encapsulation cell. The additional design capacity provides a contingency for unforeseen conditions that may arise during the Project. Cell 2 would be constructed over carbonate-rich waste rock and limestone host rock.

Genesis PAG Cell 3 would be constructed to accommodate approximately 0.4Mt of PAG waste rock generated during late phases of mine pit expansion. Construction of the PAG cell would begin at an elevation of 5280 feet amsl, 55 feet above the predicted recovered water elevation of 5225 feet amsl. PAG Cell 3 would be approximately 500 feet long, 900 feet wide, with an overall thickness of 80 feet. This cell would be placed against limestone rock in the northernmost portion of waste rock fill material.

External Waste Rock Disposal Facilities

Two existing external waste rock disposal facilities (Section 5 and Section 36) would be used for disposal of waste rock associated with the Genesis Project. Waste rock would be placed by end-dumping from haul trucks in lifts that facilitate reclaiming the surface to an overall 3.0H:1.0V slope to blend with surrounding topography. Design of the disposal facilities was developed using a 1.8 static factor of safety and a 1.2 pseudo-static factor of safety. Waste rock disposal facilities would be engineered for stability and designed, where practicable, with boundaries to blend with surrounding



Post Closure Contours - Proposed Action
Genesis Project
Eureka County, Nevada
FIGURE 2-11

topography. Existing surface water and sediment control structures around the base, sides, and upslope positions would be used to divert surface water run-off away from these facilities. Newmont has also proposed rounding the tops of backfill areas and waste rock disposal facilities to reduce visual effects and provide undulations and topographic relief to blend with surrounding undisturbed areas. Angular features, including tops and edges would be rounded.

Section 5 Waste Rock Disposal Facility

Expansion of the Section 5 Waste Rock Disposal Facility would not require any additional surface disturbance. Proposed vertical expansion of the facility would begin at an elevation of 5800 feet amsl and extend 160 feet to an elevation of 5960 feet amsl. The addition of 160 feet of waste rock to the existing facility would result in a total maximum height of 380 feet and average height of 220 feet above ground surface. The extension would increase the capacity of the existing facility by approximately 41Mt.

The Section 5 Waste Rock Disposal Facility would contain one PAG cell with a design capacity of 4.5Mt. Approximately 3Mt of PAG waste rock from expansion of the Genesis Pit would be placed in this encapsulation cell. A ten-foot thick rind of carbonate-rich waste rock would be placed around the PAG cell for its final configuration.

Section 36 Waste Rock Disposal Facility

Vertical expansion of this facility would increase capacity by 54Mt to a total of 157Mt. Toe elevation of the waste rock disposal facility is approximately 5460 feet amsl. The proposed crest elevation would be approximately 5940 feet amsl for a total maximum height of approximately 480 feet, and an average height of 320 feet above ground surface. Placement of waste rock would be preceded by relocation of existing growth media stockpiles (GM-1 and GM-2) (**Figure 2-2**). These stockpiles would be placed at a location that would not be disturbed by the proposed expansion.

Expansion of the Section 36 Waste Rock Disposal Facility would include construction of a PAG cell approximately 1,200 feet long, 1,100 feet wide, and 100 feet thick designed to accommodate placement of 3.1Mt of PAG waste rock. Approximately 2.2Mt of PAG waste rock from the Genesis Pit would be placed in the Section 36 PAG cell. The PAG cell would be placed above carbonate-rich waste rock, and would be completely encased with a ten-foot thick layer of non-PAG material. Floor elevation of the PAG cell would be approximately 5630 feet amsl, which is 405 feet above the predicted post-mining groundwater elevation of 5225 feet amsl.

Inspection of waste rock disposal facilities would be performed quarterly and following heavy precipitation events to detect abnormal conditions, anticipate remedial actions, and ensure integrity of ditches, berms, and collection ponds. Run-off from waste rock disposal facilities would be controlled (see Section 2.3.6 - Surface Water Controls).

2.3.5.5 Waste Rock Disposal Facility Design

Based on regional seismicity, a magnitude 7.0 earthquake was used for design of waste rock disposal facilities. Since epicenters are not closely associated with identified faults in this region, the epicenter of a maximum credible earthquake could occur anywhere within the area (Ryall 1977). Consistent with

standard and accepted design practices, the value of 0.13 gravity (g) is taken as two-thirds of the maximum horizontal ground acceleration of 0.2g expected to occur as a result of the design seismic event of 7.0 on the Richter scale. Newmont has designed the waste rock disposal facilities with a horizontal coefficient of acceleration of 0.13g used to simulate earthquake loading for a pseudostatic case (Newmont 2007a).

2.3.6 SURFACE WATER CONTROLS

No new surface water control structures would be required under the Proposed Action. Surface water run-off would be controlled within the Project area using existing diversion channels, berms, and water/sediment retention facilities as described in Section 2.2.1.4 – Surface Water Control Structures and shown on **Figure 2-3**. Sediment collection ponds and ditches would be periodically cleaned to ensure adequate capacity is maintained. Sediment would be returned to soil stockpile areas or placed on reclaimed areas within the mine area. Sediment control structures would remain active during the post-closure period until such time as reclamation has stabilized and their use is no longer required. Reclaimed areas would be routinely inspected to assess vegetation establishment and the effectiveness of erosion control. Where warranted, maintenance would be employed to promote vegetation reestablishment and repair erosional features.

2.3.7 GROWTH MEDIA SALVAGE

Prior to any new surface disturbance, growth media would be salvaged and placed in existing stockpiles for future use in reclaiming disturbed areas. Growth media would be salvaged from proposed areas of new disturbance (Bluestar Ridge Mine, in-pit backfill areas, and haul roads) and transported to stockpiles using scrapers, wheel dozers, track dozers, haul trucks, and loaders. Newmont would salvage all growth media available from the proposed disturbance areas. Salvageable soil in the Bluestar Ridge Mine, in-pit backfill areas, and haul roads range from three to six inches in depth and would yield approximately 39,000cy of growth media. Growth media stockpiles are shown on **Figure 2-2**.

Newmont would implement BMPs to reduce soil loss from stockpiles by constructing run-off control berms, mulching, adding organic matter, interim seeding, or leaving slopes in roughened condition. Soil suitability of growth media is summarized in Section 3.4.4 - Soil Resources.

Newmont estimates that approximately 100,000cy of Carlin Formation would be encountered during development of the Genesis Project. Any Carlin Formation material encountered would be evaluated for reclamation purposes and, if suitable, direct hauled to regraded areas or stockpiled for future use in reclamation.

Under the Proposed Action, expansion of the Section 36 Waste Rock Disposal Facility requires that existing growth media stockpiles (approximately 622,000cy) be relocated. Existing growth media stockpiles located on the Section 36 Waste Rock Disposal Facility would be relocated to sites identified on **Figure 2-8**.

2.3.8 HAUL AND ACCESS ROADS

Development and operation of the Genesis Project would require approximately 6,150 feet (eight acres) of new roads on private land for construction of haul roads, access roads, and service roads. Proposed haul roads would be 100- to 120-feet wide (running width) to safely accommodate haul truck traffic with a maximum gradient of ten percent. Haul and access roads associated with the Proposed Action would be internal to pit expansion and access to backfill selected pits. Haul roads would be constructed using non-PAG waste rock or in-place materials. Berms (approximately five to six feet in height) would be constructed along each side of haul roads. No change in haulage routes external to the Genesis-Bluestar Operations Area would result from the Proposed Action.

Haul roads would be maintained on a continuous basis to ensure safe, efficient haulage operations and to minimize fugitive dust emissions in accordance with the NDEP Bureau of Air Pollution Control Class II Air Quality Operating Permit No. 1041-0402.02. Access roads and service roads would be constructed to an average width of 35 feet using in-place materials and non-PAG waste rock similar to haul roads.

2.3.9 ANCILLARY FACILITIES

Existing ancillary facilities in the North Operations Area complex (e.g., a truck shop, office building, light vehicle shop, and a fuel island) would be used to support mining activities at the Genesis Project. No new ancillary facilities would be needed to support the Proposed Action.

2.3.10 ENERGY USE

Estimated diesel fuel consumption for the Genesis Project would be approximately 6 million gallons annually and about 70.4 million gallons over the twelve-year life of the Project. Electrical power consumption associated with processing oxide leach ore at the North Area Leach Facility is estimated to be 13,200 MWh annually and 158,400 MWh over the life-of-mine. Processing refractory ore from the Genesis Project at Mill 5/6 is estimated to require about 420,500 MWh annually (5.04 gigawatt hours over twelve-year life-of-Project) (Newmont 2009a).

2.3.11 HAZARDOUS MATERIALS/SOLID AND HAZARDOUS WASTE

2.3.11.1 Hazardous Materials

Quantities Greater Than Reportable Quantities

The term "hazardous materials" is defined in 49 CFR 172.101. Hazardous substances are defined in 40 CFR 302.4 and the Superfund Amendments and Reauthorization Act Title III. Hazardous materials and hazardous substances that would be transported, stored, or used in quantities greater than the Threshold Planning Quantity designated by Title III for emergency planning at Newmont's Carlin Trend operations are summarized in **Table 2-5**.

Hazardous materials are transported to the South Operations Areas via State Highway 766 north of Carlin. U.S. Department of Transportation regulated transporters would be used for shipment. U.S. Department of Transportation approved containers would be used for on-site storage (Newmont

2007a), and spill containment structures would be provided. Hazardous materials would be stored in designated areas on private and public land.

TABLE 2-5
Hazardous Materials Management
Newmont Carlin Trend Operations

Substance	Area Used/Stored	Rate of Use (per year)	Quantity Stored On-site	Storage Method	Waste Management
Diesel Fuel	Mine/truck shop	45 Mgals	1.3 Mgals	Bulk tank	No waste
Hydraulic Fluid	Mine/truck shop	80,000 gal.s	12,000 gals	Bulk tank totes, drums	Recycled
Motor Oil	Mine/truck shop	50,000 gals	10,000 gals	Bulk tank totes, drums	Recycled
Antifreeze	Mine/truck shop	40,000 gals	8,000 gals	Bulk tank totes, drums	Recycled
Explosives	Explosive (powder) magazine	1.3 Mlbs	25,000 lbs	Magazine	No waste
Gasoline	Mine/truck shop	730,000 gals	30,000 gals	Bulk tank	No waste
Propane	Mine/surface	1.8 Mgals	350,000 gals	Bulk tank	No waste
Grease	Mine/truck shop	80,000 lbs	50,000 lbs	Totes, drums	Recycled
Cyanide	Leach Pad	4.8 Mlbs	400,000 lbs	Bulk tank	Recycled
Lime	Heap Leach Facility/Lime silo		837 tons	Silo	No waste

Mgals = million gallons ; gals = gallons; Mlbs = million pounds ; lbs. = pounds
Source: Newmont 2010.

Quantities Less Than Reportable Quantities

Small quantities of hazardous materials less than the Threshold Planning Quantity not included in **Table 2-5** would also be managed by Newmont at the respective operations areas. These include vehicle and equipment maintenance products, office products, paint, and batteries.

2.3.11.2 Solid Waste

All non-hazardous solid waste generated at the Genesis Project would be disposed in an existing NDEP approved Class III waivered landfill located within the Genesis-Bluestar Operations Area (**Figure 2-2**). Typical solid waste generated at the Project would include tires, paper and plastic packaging, and household type refuse.

2.3.11.3 Hazardous Waste

Hazardous wastes would not be generated at the proposed Genesis Project. Wastes associated with ore processing would be covered under either the North Operations Area, a Conditional Exempt Small Quantity Generator of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) (40 CFR Part 260-270), or the South Operations Area which is a Large Quantity Generator of hazardous waste as defined by RCRA.

2.3.12 EMPLOYMENT

Under the Proposed Action, Newmont would task about 687 workers from its existing Carlin Trend work force to the Genesis Project on an average annual basis. The Genesis Project would be operated on 24-hours per day, seven days per week basis providing stable employment over the twelve-year mine life. The proposed Genesis Project would not result in hiring new employees, but would extend the mine-life and therefore employment of Newmont's Carlin Trend work force.

2.3.13 RECLAMATION

Reclamation activities for the Genesis Project are designed to meet State of Nevada requirements (Nevada Revised Statutes [NRS] 519A.010-519A.290 and NAC 519A.010 – 519A.415) and achieve post-mining land uses consistent with the Elko Resource Area Resource Management Plan (BLM 1987). Reclamation is designed to return disturbed land to a level of productivity comparable to pre-mining levels associated with adjacent land. Post-mining land uses include wildlife habitat, livestock grazing, dispersed recreation, mineral exploration and development. Certain mine components (e.g., open mine pit) may have restrictive post-mine land uses.

Short-term reclamation goals would be to stabilize disturbed areas and protect adjacent undisturbed areas from unnecessary or undue degradation. Long-term reclamation goals include public safety, stabilization of the site, and establishment of a productive vegetative community consistent with post-mining land uses.

2.3.13.1 Redistribution of Growth Media

During initial mine development on private property in the Genesis-Bluestar Operations Area, salvage of growth media may not have been sufficient to reclaim current levels of disturbance as the mining occurred before the State of Nevada instituted reclamation requirements for private land. In recognition of this deficiency, Newmont has proposed to haul approximately 3.0 million cubic yards (Mcy) of Tertiary Carlin Formation material from the East Lantern Waste Rock Disposal Facility for use as growth media in reclamation of all disturbed and redisturbed areas associated with the proposed Genesis Project (985 acres). This material would provide two feet of growth media for placement over in-pit (Beast, Bluestar, and Genesis) and external (Sections 5 and 36) waste rock disposal facilities and access and haul roads. Approximately 622,000cy of growth media from existing stockpiles and approximately 39,000cy that would be salvaged from the Bluestar Ridge Pit also would be used for reclamation. There may be as much as 100,000cy of Carlin Formation material produced during expansion of the Genesis Pit that may be suitable for use in reclamation. Haulage of 3.0Mcy of Carlin Formation growth media from the East Lantern Waste Rock Disposal Facility would require about 9,500 trips using Cat 793 haul trucks with a 260-ton capacity.

Prior to replacing growth media, disturbed areas would be regraded to create a stable post-mining configuration, establish effective drainage to minimize erosion, and protect surface water resources. To the extent practicable, grading would blend disturbed areas with the surrounding terrain.

Mine Pits

The previously mined Beast and Bluestar pits would be used as in-pit waste rock disposal facilities and backfilled to elevations above existing pit rims by 340 and 440 feet, respectively. Slopes resulting from backfill of these pits would be regraded to an overall average of 3.0H:1.0V. Grading would be done to minimize erosion, facilitate reclamation activities, (seeding, mulching), and provide a surface that would support vegetation. The top of the waste rock disposal facilities would be ripped and graded to an overall two percent slope to promote runoff and eliminate ponding of precipitation and snowmelt.

Following grading, two feet of growth media would be placed on disturbed areas and revegetated with the approved seed mix. Final reclaimed contours are shown on **Figure 2-11**. A computer generated graphic depicting final topographic relief at completion of the Project is shown on **Figure 2-12.**

Under the Proposed Action, the Beast and Bluestar pits would be backfilled. The Bluestar Ridge Pit would not be backfilled and would remain as an open pit following cessation of mining operations. The Genesis Pit would be partially backfilled to eliminate formation of a pit lake. Waste rock placed as backfill would slope from elevation 5370 feet amsl in the west side of the pit up to about 5650 feet amsl at the east side of the pit.

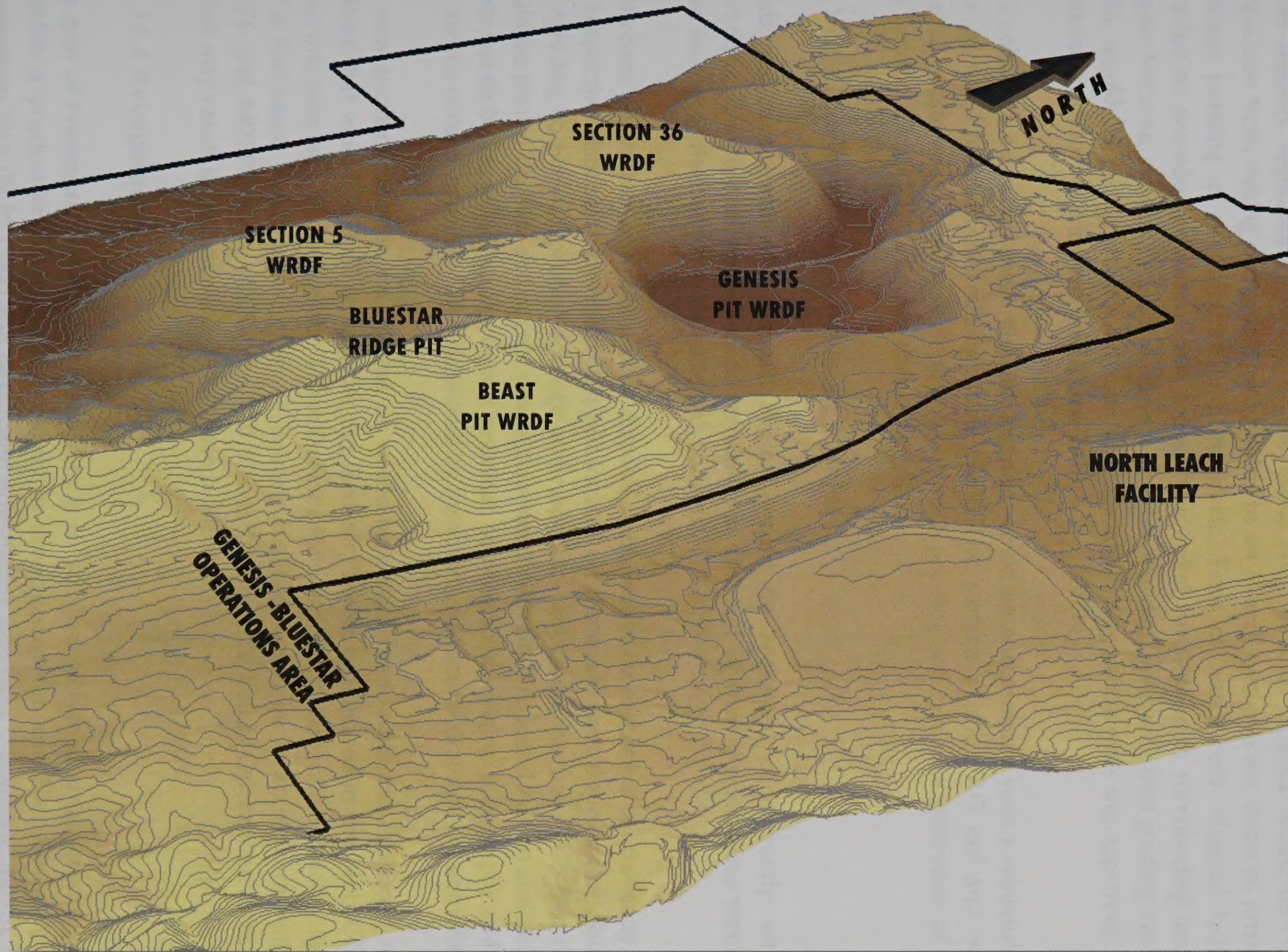
The sloped, backfilled portion of the pit would be covered with two feet of growth media and revegetated. Some ponding of precipitation and storm water runoff could be expected in the lowest portions of backfilled material near the base of the west highwall, which would likely rapidly evaporate or infiltrate into carbonate rock of the Roberts Mountain Formation.

A highwall (approximately 25,000 linear feet) would remain around the west and north portions of the Genesis-Bluestar Pit. The highwall at the west end of the pit would range in elevation from 5370 feet amsl to 5850 feet amsl.

Growth media salvaged during development of the Bluestar Ridge Pit would be used during reclamation of associated haul roads, in-pit backfill of the Beast Pit, and the Section 36 Waste Rock Disposal Facility. Some ponding of water could be expected in the bottom of the pit in response to rain events or snowmelt run-off but would likely rapidly evaporate or infiltrate into carbonate rock, which would form the bottom of the completed pit.

Approximately 10,000 linear feet of safety berms would be constructed around the open pits and warning signs posted to identify potential hazards associated with open-pit highwalls or open excavations (see Section 2.2.1.5 – Reclamation). Berms would be revegetated with the approved seed mixture. Newmont would maintain the berms and signs, until reclamation monitoring is complete. Proposed location of berms around the Bluestar Ridge and Genesis pits are shown on **Figure 2-11**.

Newmont will remove the signs from public land upon release of reclamation liability.



Not To Scale

Conceptual Topographic Relief
Final Reclamation
Genesis Project
Eureka County, Nevada
FIGURE 2-12

2.3.13.2 External Waste Rock Disposal Facilities

Reclamation of waste rock placed in the Section 5 and Section 36 Waste Rock Disposal facilities under the Proposed Action would be regraded to an overall average slope of 3.0H:1.0V. Grading would be done to minimize erosion, facilitate reclamation activities, (seeding, mulching), and provide a surface that would support vegetation. The top of the waste rock disposal facilities would be ripped to relieve compaction from mining equipment and graded to an overall two percent slope to promote runoff and eliminate ponding of precipitation and snowmelt. Tops of waste rock disposal facilities would be regraded to provide undulations and topographic relief to blend with surrounding undisturbed areas. Angular features, including tops and edges would be rounded. Following final grading, two feet of growth media would be placed on the disposal facilities and revegetated with the approved seed mix. Final reclaimed contours are shown on **Figure 2-11**.

PAG cells located within these disposal facilities would be encapsulated with a minimum ten-foot thick layer of non-PAG acid-neutralizing waste rock. The surface of the PAG cell and overlying surface material (waste rock) would be sloped to eliminate ponding and minimize infiltration of meteoric water (see Section 2.3.5.3 - PAG Encapsulation Cells).

2.3.13.3 Haul Roads and Ancillary Facilities

Roads associated with the Genesis Project would be reclaimed concurrently with cessation of operations in individual areas. Roads remaining at the end of mining operations would be reclaimed when no longer needed for reclamation and access.

Haul roads associated with waste rock disposal areas would be reclaimed concurrently with closure of the respective disposal area. Haul roads not located on the waste rock disposal site would be reclaimed by regrading to provide proper drainage and ripped to reduce compaction. Two feet of growth media would be placed on haul and access roads associated with the Proposed Action and seeded. Reclaimed roads would be regraded, to the extent practical, to reestablish original topography and drainage of the site and to control erosion. Culverts would be removed and natural drainage reestablished.

No new ancillary facilities are needed or would be constructed under the Proposed Action. Ancillary facilities that would be used to support the Genesis Project are located in the North Operations Area about one mile east of the Project. These facilities include a truck shop, office building, light vehicle shop, and a fuel island. Reclamation of these existing facilities would be in accordance with NDEP permit #0176 and NDEP permit #0056 for Mill 5/6 at Newmont's South Operations Area. The Proposed Action may result in an extended life of these facilities.

2.3.13.4 Revegetation

The goal of Newmont's revegetation program is to stabilize reclaimed areas, ensure public safety, and establish a productive vegetative community in accordance with the Elko Resource Area Resource Management Plan (BLM 1987) and designated post-mining land uses (Newmont 2007b). Plants proposed for use on backfilled mine pits, waste rock disposal facilities, and haul roads are shown in **Table 2-6**. Modifications to the seed list, application rates, cultivation methods, and techniques may change based on success of concurrent reclamation. Site-specific seed mixtures and application rates would be

developed through consultation with and approval by BLM, NDEP, and NDOW. Seedlings may be substituted for seeds. The seed mix selected would represent a Reclaimed Desired Plant Community and the mix would be appropriate for each ecological site in the Project area. A perimeter fence along the permit boundary would remain in place until vegetation is established on reclaimed areas.

TABLE 2-6
Reclamation Seed Mixture

Species		Pounds Pure Live Seed per Acre
Common Name	**Scientific Name**	
Bluebunch wheatgrass	*Agropyron spicatum*	2
Western wheatgrass	*Agropyron smithii*	2
Great Basin wildrye	*Elymus cinerus*	2
Small burnet	*Sanguisorba minor*	2
Fourwing saltbush	*Atriplex canescens*	3
Prostrate summer cypress	*Kochia prostrata*	1.5
Cicer milkvetch	*Astragalus cicer*	1.5
Sandberg bluegrass	*Poa sandbergii*	1
Wyoming Big Sagebrush	*Artemisia tridentata wyo.*	0.1
TOTAL		**15.1**

Source: Newmont 2007b.

Vegetation on reclaimed areas likely would be dominated by grasses with low densities of native forbs and shrubs. Typically, communities of big sagebrush, the most extensive pre-mining plant community, have proven difficult to re-establish on reclaimed land (Schuman and Booth 1998; Vicklund *et al.* 2004). Establishment of big sagebrush on reclaimed land has been shown to benefit from application of mulch, inoculation with *arbusucular mychorrizae*, reduced competition with herbaceous species (lower seeding rate of grasses and forbs), and direct-placed topsoil (Schuman and Booth 1998). *Arbuscular mychorrizae* are soil fungi that form a symbiotic relationship with roots of sagebrush and other plants, which improves drought tolerance. *Arbuscular mychorrizae* are lost when topsoil and other growth media are stockpiled. Newmont would provide inoculation with a*rbuscular mychorrizae* during the revegetation phase of reclamation.

Criteria for bond release of revegetated areas would be in accordance with the final version of the Revised Guidelines for Successful Mining and Exploration Revegetation (BLM NV IM 99-013), NRS 519A, and 43 CFR 3809.420, which requires, in part, "...establishment of a stable and long-lasting vegetative cover that is self-sustaining and, considering successional stages, will result in cover that is:

- Comparable in both diversity and density to pre-existing natural vegetation of the surrounding area; or
- Compatible with the approved BLM land use plan or activity."

Newmont would continue annual weed surveys to direct weed control efforts as described in Section 2.2.1.6 - Invasive, Non-native Species.

2.3.13.5 Reclamation Schedule

As various facilities reach the end of their period of use, Newmont would initiate reclamation activities concurrent with ongoing mining operations. As mining operations progress, backfilled portions of mined-out pits would be concurrently regraded, topsoiled, and seeded. In some areas, growth media would be temporarily stockpiled to allow adequate backfilling and regrading of mined-out portions of the pit prior to placement of growth media. The reclamation schedule would encompass the period between cessation of mining through post-reclamation monitoring as shown in **Table 2-7**.

Reclamation would take place concurrent with operations where possible. The proposed post-reclamation topography for the Genesis Project is shown on **Figure 2-11**. A Final Permanent Closure Plan meeting State of Nevada requirements (NAC 445A.447) would be filed with NDEP two years prior to closure of the mine.

2.3.13.6 Monitoring/Evaluation of Reclamation

Newmont, in cooperation with BLM and NDEP, would evaluate the status of vegetative growth during three full growing seasons following completion of planting. Final bond release may be considered at that time. Interim progress of reclamation at the Genesis Project area would be monitored as requested by the agencies. Water monitoring, as described in the Resource Monitoring section of this chapter, would also be used in evaluating reclamation success.

2.3.14 RESOURCE MONITORING AND OPERATOR COMMITMENTS

2.3.14.1 Air Quality

Emissions would be monitored in accordance with requirements imposed by an existing NDEP Air Quality Operating Permit issued for Newmont's North Area Operations (AP 1041-0402.02). Newmont would control fugitive dust emissions in accordance with NRS 445B.230.6 and its Fugitive Dust Control Plan approved by NDEP-Bureau of Air Pollution Control. The Plan outlines the use of water and/or other surface treatments such as chemical binders (mag-chloride), and interim and concurrent reclamation.

2.3.14.2 Water Resources

Water resources in the Project area are monitored as part of Newmont's Maggie Creek Basin Monitoring Plan and Barrick's Boulder Valley Monitoring Plan. The monitoring programs have been developed in conjunction with Nevada Division of Water Resources (NDWR)/State Engineer to address groundwater, springs/seeps, and streams/rivers. The purpose of water monitoring is to establish baseline data and report changing conditions as mining and ore processing operations are conducted in the area.

Water quality, groundwater levels, and surface water flow will continue to be monitored in the area as required at designated monitoring wells, springs and seeps, and surface water stations. Monitoring reports will be prepared by Newmont to summarize water resource monitoring data collected. These reports are submitted periodically to NDWR/State Engineer, NDEP, and BLM.

TABLE 2-7
Tentative Reclamation Schedule
Genesis Project

Operation		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Activity	Location										
Backfill Mine Pits											
	Beast Pit	Approximately 95.4Mt of waste rock placed to an elevation 340 feet above existing pit crest.									
	Bluestar Pit	Approximately 46.5Mt of waste rock placed to an elevation 440 feet above existing pit crest.									
	Genesis Pit					Approximately 213.6Mt of waste rock placed to fill about 1,000 feet of pit and sloped to elevations from 5,310 to 5,650 amsl.					
Reclaim Waste Rock Disposal Facilities (WRDFs)											
	Beast WRDFs						Includes ripping, regrading and revegetation.				
	Bluestar WRDFs						Includes ripping, regrading and revegetation.				

		Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Reclaim Waste Rock Disposal Facilities (WRDFs), continued.											
	Genesis WRDFs	Includes ripping, regrading and revegetation.									
	Sec. 36 WRDFs		Includes ripping, regrading and revegetation.								
	Sec. 5 WRDFs			Includes ripping, regrading and revegetation.							
Construct Safety Berms											
	Genesis Pit	Approx. 9,500 ft									
	Bluestar Ridge			Approx. 300 ft							
Haul & Access Roads – Roads would be reclaimed when no longer needed to support mining and other related activities											
Monitoring											
	Vegetation										
	Water Quality										

Wildlife

Where possible, land clearing and surface disturbance would be timed to prevent destruction of active bird nests or disturbance of young birds during the avian breeding season (May 1 to July 15, annually) to comply with the Migratory Bird Treaty Act. If surface disturbing activities are unavoidable, Newmont would have a qualified biologist survey areas proposed for disturbance to identify active nests. If active nests are located, or if other evidence of nesting is observed (mating pairs, territorial defense, carrying nesting material, transporting of food), the area would be avoided to prevent destruction or disturbance of nests until the birds are no longer present. Avian surveys would be conducted only during the breeding season and immediately prior to Newmont's activities that would result in disturbance. After such surveys are performed, and disturbance created (i.e., road construction), Newmont would not disturb additional land during the avian breeding season without first conducting another avian survey in compliance with Migratory Bird Treaty Act (Newmont 2007a). In addition, Newmont must procure and adhere to numerous permits to ensure protection and preservation of wildlife. Although these requirements benefit wildlife, the BLM has not identified any change to impacts that affect these resources. Therefore, these requirements are not enumerated here.

In November 2008, representatives of NDOW, BLM, Newmont, and Barrick Gold of North America formed the Area 6 Mule Deer Working Partnership to identify mule deer issues from a landscape scale over the long term and to avoid addressing the issue on a project by project basis. The working group is developing habitat management practices to ensure maintenance and improvement of mule deer health, including herd migration capability and vegetation composition, in portions of NDOW Wildlife Management Units 067 and 068.

2.3.14.3 Cultural Resources

Cultural resource inventories have been completed for the Genesis Project area. No sites eligible for listing on the National Register of Historic Places would be affected. New sites that may be discovered during proposed surface disturbing activities or by future cultural inventories would either be avoided or mitigated by Newmont in accordance with 43 CFR 3809.420(8) and Section 106 of the National Historic Preservation Act (see Section 3.2.7 - Cultural Resources).

2.3.15 POST-CLOSURE MONITORING

2.3.15.1 Water Resources

Groundwater monitoring associated with the Genesis Project would be in accordance with and included as part of Newmont's ongoing Maggie Creek Basin Monitoring Plan (Newmont 1992). Surface water monitoring would continue until vegetation is established and/or until monitoring is determined by NDWR/State Engineer, NDEP, and BLM to no longer be necessary.

2.3.15.2 Vegetation

Reclamation goals for mining disturbances are to 1) establish stable landforms that control erosion, landslides, and water run-off, and 2) establish a productive vegetative community based on the designated post-mining land uses. The goal of revegetation would be to achieve as close to 100 percent

of the perennial plant cover of selected comparison areas as possible. The comparison, or reference, areas would be selected from representative plant communities adjacent to the mine site, test plots or demonstration areas or, as appropriate, representative ecological or range site descriptions.

2.4 ALTERNATIVES ELIMINATED FROM DETAILED ANALYSIS

This section described alternatives to the Proposed Action that were eliminated from further review in the EIS. These alternatives were identified by BLM during review and analysis of the Proposed Action. These alternatives were considered technically infeasible, unreasonable, provided no environmental advantage over the Proposed Action, or would not meet the purpose and need for the Proposed Action. The rationale for dismissing these alternatives is provided.

2.4.1 UNDERGROUND MINING

Underground mining was evaluated as an optional mining method for recovery of ore associated with the Proposed Action. Underground mining methods are typically used when extracting deep, high-grade ore usually found in veins or narrow zones.

Gold associated with the Genesis Project ore body is disseminated throughout a major portion of the rock mass. This type of ore body does not lend itself to underground mining methods because the volume of rock that would need to be removed and processed to recover the gold cannot economically be achieved without use of large-scale open pit mining methods.

Other factors that affect the method and cost of mining an ore reserve include continuity of the mineralized material, depth to mineralization, and volume of material to be mined. The mineralized zone in the proposed pit expansion area meets economic reserve requirements for open-pit mining methods largely due to the fact that it is an extension of an existing pit where a major portion of the overburden has been previously removed.

Development of the remaining ore reserves in the Genesis Pit by underground methods would be cost prohibitive and therefore economically unfeasible.

2.4.2 COMPLETE BACKFILL OF THE BLUESTAR RIDGE PIT

Under this alternative, Newmont would be required to backfill the Bluestar Ridge Mine Pit. The Bluestar Ridge Pit is the least economical of all proposed mining and would be the last site developed. As such, the pit would not be available to receive backfill until mining ceases.

Approximately 9Mt of waste rock and 4.4Mt of ore would be mined from the pit. Assuming an in-place rock density of 1.26 tons per cubic yard, the total volume of the Bluestar Ridge Pit at the end of mining would be approximately 10.6Mcy. Assuming a swell factor of 30 percent, approximately 7.42Mcy of waste rock would be required to backfill the pit.

The estimated cost of re-handling 7.42Mcy of waste rock would be $1.50 per cubic yard or $11.13 million. The cost of backfilling the Bluestar Ridge Pit would make mining the pit economically unfeasible.

2.4.3 GENESIS PIT HIGHWALL REDUCTION TO FACILITATE MULE DEER MIGRATION

Under this alternative, Newmont would be required to reduce a portion of the north highwall remaining in the Genesis Pit at the end of the mining operations to facilitate mule deer migration through the area. This alternative would involve placement of backfill against the northern highwall of the partially backfilled Genesis Pit at the end of mining. The backfill would be placed such that a 3.0H:1.0V slope configuration would be created linking the top of the highwall (pit rim) to the floor of the pit. Assuming that a portion of the northwest highwall receives this treatment, approximately 40 acres of land would be converted from highwall to a slope that would be revegetated. Approximately 4Mcy of waste rock would be rehandled by loading into haul trucks and dumped and graded to form the slope.

An optional method would involve blasting a portion of the highwall to create a slot through the highwall extending from the floor of the pit to the upper pit rim. The slot would be approximately 100 feet wide and sufficient waste rock would be placed in the slot to create a 3.0H:1.0V slope extending to the floor of the pit. This treatment would result in converting approximately one acre of land from highwall to a slope that would be revegetated.

This alternative was eliminated because the likelihood that mule deer would use this pathway during migration is unknown. In addition, the cost of rehandling approximately 4Mcy @ $1.50/cy = $4.5M would affect the economic feasibility of the mine development and require additional consumption of energy for dubious results.

2.4.4 ALTERNATIVE LOCATION FOR PAG CELLS

BLM received a request to consider alternative locations for PAG cells. The request did not identify any impact to any resources that might occur due to the proposed location of the PAG cells. During review, BLM could not identify any potential impact to any resource due to the proposed location of the PAG cells, therefore development of alternate locations was determined to be unnecessary.

2.4.5 PLACING PAG MATERIAL BELOW GROUNDWATER LEVEL

This alternative would require placement of PAG waste rock below the predicted post-mining groundwater elevation (5225 feet amsl). The Genesis Pit would be the only pit mined to an elevation below 5225 feet amsl, and therefore eligible to receive PAG rock backfill. Under this alternative Newmont would be required to revise proposed waste rock handling and management until mining operations in the Genesis Pit are complete and PAG rock could be placed. The temporary storage and rehandling of potentially millions of tons of waste rock would increase Newmont's costs, compared to the Proposed Action, and reduce the economic viability of the Project.

Geochemical modeling indicates no adverse impacts to groundwater or other resources would occur from PAG material placed in accordance with the Proposed Action. Therefore, there is no discernible potential benefit from the alternative and no reason to further analyze it.

2.5 COMPARISON OF ALTERNATIVES

The No Action Alternative is the only alternative considered due to the lack of resource impacts for which the analysis of alternatives would have been appropriate. Under the No Action Alternative, Newmont would not be authorized to use public land in its expanded operations as proposed. The lack of authorization may make the mining of the 60Mt of ore economically impractical, potentially leading to loss of employment and loss of tax revenues to local government. The No Action Alternative, under existing authorizations, would also mean the eventual creation of a pit lake in the Genesis Pit as groundwater rebounds to pre-mining levels. A comparison of the Proposed Action and No Action Alternative is contained in **Table 2-8**. Potential impacts resulting from implementation of the Proposed Action and applicant proposed environmental protection measures are also summarized in **Table 2-8**.

2.6 BLM PREFERRED ALTERNATIVE

The BLM has identified a preferred alternative based on the analysis in this EIS. This preferred alternative is the alternative that best fulfills the agency's statutory mission and responsibilities, considering economic, environmental, technical, and environmental protection measures (**Table 2-8**). The Proposed Action has evolved over the course of BLM's review of the POO under 43 CFR 3809 regulations and the environmental impact analysis during compilation of the EIS including waste rock management, growth media replacement volumes and sources, and reclamation regrading and contours. The BLM has determined that the preferred alternative is the Proposed Action as outlined in Section 2.3 of this chapter.

The Proposed Action includes mining of 450Mt of waste rock, including an estimated 28Mt of PAG rock, expansion of the Section 36 and Section 5 Waste Rock Disposal Facilities, backfilling the Beast and Bluestar pits and partial backfilling of the Genesis Pit, including cells constructed for the express purpose of isolating PAG rock from meteoric water and groundwater. The Proposed Action also includes an Adaptive Management Plan for waste rock which provides for supplementary testing of waste rock geochemistry and a design for management/encapsulation of up to 128Mt of PAG waste rock, more than 100Mt than is presently expected. The Proposed Action includes mining 60Mt of ore, of which 48Mt is destined for the North Area Leach Facility, adjacent to the Genesis-Bluestar Operations Area, and 12Mt is destined for the Mill 5/6 located at the South Area Operations Area just north of Carlin, Nevada. The Proposed Action would eliminate the potential for development of a pit lake in the Genesis Pit which would have occurred under the No Action Alternative and would restore an additional 300 acres of land surface to productive use. In addition, the Proposed Action would provide employment for most of the work force currently tasked to the Genesis-Bluestar Operations Area. The Project would provide long-term operations in this area, with consequent potential for stable employment levels over the twelve-year mine life. The proposed Genesis Project would not result in hiring new employees, but would extend the mine-life and therefore average annual employment of approximately 687 of Newmont's Carlin Trend work force. Continued mine employment at the Genesis Project would maintain quality-of-life for workers and their families.

TABLE 2-8
Potential Impacts and Applicant Proposed Environmental Protection Measures
Genesis Project

Resource	Potential Impact: Proposed Action	Potential Impact: No Action	Applicant Proposed Environmental Protection Measures
Mining Operations	Removal of 450Mt of waste rock and 60Mt of ore over a twelve-year mine life.	Approximately 2.6Mt of run-of-mine oxide ore will be placed on the North Area Leach Facility. Newmont does not anticipate processing any oxide mill or refractory ore during the remaining mine life under authorized operations.	Waste Rock Management Plan
	Backfill of additional 300 acres of mine pits leaving 150 acres of open pits	About 450 acres remaining as open pits	
	Elimination of pit lake	Formation of pit lake of about 41 acres	
Reclamation Activities	Revegetation of additional 300 acres that would have remained as open pits	About 450 acres of open mine pits would remain and not be revegetated	Revegetation plan calls for use of native grass, forb, and shrub species
	All disturbed areas not currently under reclamation would be covered with 2-feet of Carlin Formation growth media.	Disturbed areas would be reclaimed in accordance with existing approved plans.	Tops of waste rock disposal facilities would be regraded to provide undulations and topographic relief to blend with surrounding undisturbed areas.
Air Quality	Sulfur dioxide (SO_2), carbon monoxide (CO) oxides of nitrogen (NO_X), volatile organic compounds (VOCs) and particulate emissions would continue over the twelve-year life of the Genesis Project.	Gaseous and particulate emissions described under the Proposed Action will continue to be generated until currently permitted mining activities cease in 2010.	Monitoring of gaseous emissions (NO_x, CO, and SO_2) is not required by existing NDEP Air Quality Operating Permit issued for Newmont's North Area Operations (AP 1041-0402.02).
	Fugitive dust would be produced during mine operations and from wind blowing over exposed or disturbed surfaces.	Fugitive dust sources would continue for the remaining life of operations.	Fugitive emissions would be controlled using BMPs as defined by the Nevada State Conservation Commission (1994). Dust emissions would be controlled through use of water, approved chemical binders or wetting agents, dust collection devices, water sprays, and revegetation of disturbed areas concurrent with operations.

TABLE 2-8
Potential Impacts and Applicant Proposed Environmental Protection Measures
Genesis Project

Resource	Potential Impact		Applicant Proposed Environmental Protection Measures
	Proposed Action	No Action	
Greenhouse Gas	Approximately 65,000 tons of CO_2 would be emitted annually from approximately 5.87 million gallons of annual diesel fuel consumption	Approximately 4,100 tons of CO_2 would be emitted annually from consumption of 370,000 gallons of diesel fuel	Emissions would be controlled through proper operation and maintenance of equipment
Mercury Emissions	Processing 4.0Mt of oxide mill ore annually on the North Area Leach Facility and 837,500 tons of refractory ore (annually) from the Genesis Project would emit a total of 51.2 pounds of mercury annually.	No oxide mill or refractory ore will be mined at Genesis or processed at Mill 6 during the remaining mine life (ending 2010).	No emission standards for mercury have been adopted for gold processing operations. Newmont will continue to comply with NDEP guidelines.
Geology and Minerals	Waste rock associated with the proposed Genesis Project would be used to backfill mined-out pits or placed in waste rock disposal facilities. Depending on residual ore reserves in individual mine pits, backfilling of mined-out pits at current gold prices would result in limiting access to remaining ore reserves. Placement of waste rock generated from the Genesis Project would not result in decreased stability of existing disposal facilities in the Project area.	Approximately 2.6Mt of run-of-mine oxide ore will be mined over the remaining life of mine ending in 2010. Newmont does not anticipate processing any oxide mill or refractory ore during the remaining mine life under authorized operations.	
	Partial backfilling of the Genesis Pit would eliminate formation of a pit lake.	A pit lake (about 41 acres) would begin to form in the Genesis Pit approximately 100 years after cessation of mine dewatering activities at the Leeville, Betze/Post, and Gold Quarry mines.	
	Backfilling mine pits would provide a net increase of about 300 acres that would be reclaimed as wildlife habitat and livestock grazing.	Under current authorization and closure plans approximately 450 acres of mine pits will remain open.	

TABLE 2-8
Potential Impacts and Applicant Proposed Environmental Protection Measures
Genesis Project

Resource	Potential Impact – Proposed Action	Potential Impact – No Action	Applicant Proposed Environmental Protection Measures
Geology and Minerals (continued)	PAG waste rock would be encapsulated in cells constructed within backfilled portions of mine pits and in the Section 5 and Section 36 Waste Rock Disposal facilities.	PAG waste rock will be placed in an encapsulation cell constructed at the Section 36 Waste Rock Disposal Facility.	A quarterly waste rock management report that summarizes mining progress, monitoring, and disposition of waste rock would be submitted to BLM and NDEP.
Water Quantity and Quality	The Proposed Action would not result in a modification of surface water conditions in the Project area. No perennially or ephemeral flowing streams or drainages are located within the footprint of the Proposed Action.	No perennial or ephemeral flowing streams or drainages are located within the footprint of existing permitted activities.	Existing diversion channels, sediment basins, and other surface water (sediment) control structures have been constructed to control storm water run-on/run-off; Sediment control structures include silt traps and fences using certified weed free straw, hay bales, or geotextile fabric, and sediment ponds.
	Groundwater that would be pumped (up to 250 gpm) for the proposed Genesis Project is compartmentalized groundwater and not in direct contact with the regional groundwater system. Groundwater pumped from this location is not expected to alter the general regional groundwater condition that is being affected by large-scale dewatering systems currently operating at the Betze/Post, Leeville, and Gold Quarry mines.	The existing Genesis Pit lies within the groundwater drawdown area resulting from ongoing dewatering activities at Betze/Post, Leeville, and Gold Quarry mines.	Water resources in the Project area are monitored as part of Newmont's Maggie Creek Basin Monitoring Plan and Barrick's Boulder Valley Monitoring Plan. The monitoring programs have been developed in conjunction with the NDWR/State Engineer to address groundwater, springs/seeps, and streams/rivers.

TABLE 2-8
Potential Impacts and Applicant Proposed Environmental Protection Measures
Genesis Project

Resource	Potential Impact		Applicant Proposed Environmental Protection Measures
	Proposed Action	No Action	
Water Quantity and Quality (continued)	Partial backfilling of the Genesis Pit would eliminate formation of a pit lake; thereby reducing water loss through evaporation. Groundwater would eventually become reestablished in the lower portion of pit backfill, but is expected to be similar to surrounding groundwater quality because the rock would be non-PAG.	A pit lake (about 41 acres) would begin to form in the Genesis Pit approximately 100 years after cessation of regional mine dewatering. This lake would be a source of water loss (evaporation) and potentially degraded water quality that could eventually mix with natural groundwater.	Monitor groundwater and surface water quality in accordance with Maggie Creek Basin and Boulder Valley Monitoring Plans
Soil Resources	Proposed Genesis Project would result in 43 acres of new disturbance. Impacts include: o soil loss during salvaging, when growth media is stockpiled and stabilized in stockpile areas; o loss between final redistribution and completion of reclamation; o modification of chemical and physical characteristics; o wind erosion; and o decreased biological activity. o All disturbed areas not currently under reclamation would be covered with 2-feet of Carlin Formation growth media.	Impacts associated with the Proposed Action would not occur. Existing growth media (approximately 622,000 cubic yards) would be placed over areas with coarse material and little or no fines. Areas with adequate fines would be direct seeded.	Direct haul and place growth media on regraded disturbed areas where possible. Revegetate growth media stockpiles during first appropriate season. Soil excavated from sediment retention ponds would be placed in stockpiles or spread over regraded areas. Sediment control structures would remain active during the post-closure period until such time as reclamation has stabilized and their use is no longer required. Reclaimed areas would be routinely inspected to assess vegetation establishment and the effectiveness of erosion control. Where warranted, maintenance would be employed to promote vegetation reestablishment and repair erosional features.

TABLE 2-8
Potential Impacts and Applicant Proposed Environmental Protection Measures
Genesis Project

Resource	Potential Impact		Applicant Proposed Environmental Protection Measures
	Proposed Action	No Action	
Vegetation (Including Invasive, Non-native Species)	Approximately 43 acres of new disturbance associated with the Genesis Project.	No new disturbance	Revegetation plan calls for use of native grass, forb, and shrub species. Planting and seeding techniques would be coordinated with BLM and NDOW at closure.
	In-pit backfill would provide a net increase of approximately 300 acres in land surface that would support wildlife habitat and livestock grazing.	About 450 acres of open mine pits would remain and not be revegetated.	
	The Bluestar Ridge Pit (26 acres) would not be backfilled and remain as an open pit following completion of mining operations.	Bluestar Ridge Pit would not be developed.	
	Approximately 17 acres associated with haul roads and exploration activity would be revegetated.	Disturbance (17 acres) associated with access and haul roads would not occur.	
	Invasive, non-native species may spread to newly disturbed areas. Ongoing weed control program would limit impacts.	Invasive, non-native infestations will be monitored and controlled under ongoing weed control program.	Newmont would conduct annual weed surveys to direct weed control efforts. Weed control efforts would continue for the life-of-mine and reclamation period to reduce potential impacts of new infestations. Certified weed free straw bales would be used for sediment control.
	No impacts to special status plants.	No additional impact to special status plant species or their habitat would occur.	

TABLE 2-8
Potential Impacts and Applicant Proposed Environmental Protection Measures
Genesis Project

Resource	Potential Impact		Applicant Proposed Environmental Protection Measures
	Proposed Action	No Action	
Terrestrial Wildlife, Special Status Species, Migratory Birds	Proposed Project would affect 43 acres of sagebrush/grassland habitat.	Impacts associated with 43 acres of sagebrush/grassland would not occur.	Concurrent reclamation of disturbed areas where possible. Especially as it relates to enhancing big game movement through the area. Reclamation that will begin to reverse the percentage of lower value habitat that will remain at end of mine life,
	Minimal impacts to special status wildlife species due to lack of water and habitat available.	No additional impact to special status wildlife species or their habitat would occur.	
	In-pit backfill of open mine pits would provide a net increase of about 300 acres capable of supporting wildlife habitat, livestock grazing, and provide transitional habitat linkage to winter range. 124 acres of land surface would remain as highwall that could support wildlife species. The proposed project would extend area habitat fragmentation for another twelve years. Loss of 43 acres of breeding habitat for migratory birds (including raptor species). Net increase of lower value habitat that could modify species use patterns from historic pre-mine usage. Potential use of mule deer utilizing the new Section 36 and Bluestar Ridge haul roads.	About 450 acres of open mine pits would remain and not be revegetated.	

TABLE 2-8 Potential Impacts and Applicant Proposed Environmental Protection Measures Genesis Project			
Resource	**Potential Impact**		**Applicant Proposed Environmental Protection Measures**
	Proposed Action	**No Action**	
Social and Economic Resources	The proposed Genesis Project would not result in hiring new employees, but would provide long-term operations in this area, with consequent potential for stable employment levels for an annual average of 687 workers over the twelve-year mine life.	Closure of the Genesis-Bluestar Operations Area would likely reduce the work force beginning about 2010. Loss of 687 jobs annually over a twelve-year mine life. Actual effects of laid off workers would depend on the timing and availability of other employment in the area when layoffs occur.	
	Provide $54 million in annual wages for the area over the lifetime of the Project. Support continuation of about 584 secondary jobs in Elko and Eureka counties' economy during the twelve years of operation, providing an additional $23 million of indirect and induced wages annually.	Reduced wages spent in the local economy, decreased revenue to local and state jurisdictions, increased stress on public assistance programs, and decreased quality-of-life for some residents.	
	Sales, property, and net proceeds taxes would continue to be paid to Elko and Eureka counties. Continued mine employment at the Genesis Project would maintain quality-of-life for workers and their families.		

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This section describes the (a) affected environment in the proposed Genesis Project area; (b) direct and indirect impacts associated with the Proposed Action and No Action Alternative; and (c) cumulative effects of the Proposed Action and No Action Alternative when combined with past, present, and reasonably foreseeable future activities in the vicinity of the Genesis Project. In the following sections, "Project area" refers to land associated with the Proposed Action located within the Genesis-Bluestar Operations Area permit boundary.

Baseline information presented in this chapter was obtained from published and unpublished material; discussions with federal, state, and local agencies; field and laboratory studies conducted in the Project area, and on-site experience with mining and reclamation. The affected environment (Study Area) for individual resources was delineated based on the area of potential direct and indirect environmental impacts for the proposed Project. Each resource analysis in this chapter includes a description of the geographic area considered to be the study area for that resource and the rationale for the designation.

The proposed Genesis Project may result in cumulative effects associated with other past, present, and reasonably foreseeable future activities in the area. For resources where Project-specific impacts are identified, the cumulative effects associated with the proposed Project have been evaluated within the respective resource-specific Cumulative Effects Study Area (CESA), together with other past, present, and reasonably foreseeable future activities.

Mitigation measures that would reduce or limit environmental or social impacts that could result from the Proposed Action may be required by BLM as a condition or stipulation of approval for authorization of the Proposed Action. Stipulations or conditions attached to the ROD for the proposed amendment to the Genesis-Bluestar Plan of Operations would conform to regulatory provisions in 43 CFR 3809.

Existing permitted mining operations including mine pits, waste rock disposal facilities, and haul roads have altered the landscape and represent the characteristic environment in the Project area. The Proposed Action represents an additional 43 acres of new disturbance within the Genesis-Bluestar Operations Area. A description of existing mining operations is included in Section 2.2.1 – Existing Operations of this EIS.

BLM has analyzed potential impacts that could result from the Proposed Action and No Action Alternative. No other alternatives have been identified for analysis in this EIS. Potential impacts associated with current mining operations were disclosed and evaluated in documents described in **Table 1-1** of Section 1.0 - Introduction.

3.2 RESOURCES AND RESOURCE USES ELIMINATED FROM FURTHER ANALYSIS

BLM has evaluated the potential impact of the Proposed Action and No Action Alternative to the following resources and resource uses, and has determined that they would not be affected by the Proposed Action or No Action Alternative. Rationale for dismissing these resources and resource uses from further discussion in this EIS are as follows:

3.2.1 FISHERIES AND AQUATIC RESOURCES

No perennial streams are located in the Project area (BLM 1989). Consequently, no habitat is available to support fish and/or aquatic resources in the Genesis Project area. Development of the proposed Genesis Project would not affect fisheries and aquatic habitat located outside of the Project area. Limited pumping (duration and volume) of groundwater via dewatering wells would not affect base flow conditions in area streams in the Carlin Trend; larger scale dewatering programs currently employed to support other area mine projects are the primary water management systems affecting regional groundwater conditions.

3.2.2 RECREATION

Dispersed recreation opportunities in the vicinity of the proposed Genesis Project have been restricted since the early 1980s due to mining and exploration activities in the Carlin Trend. The proposed Genesis Project is within an active mine area in which public access is restricted for safety and security reasons. In addition, land within the Project area does not offer unique outdoor recreation opportunities. Portions of the area outside the Carlin Trend active mining district, including land within BLM's Elko District, contain large areas of similar recreational resources available to the public.

3.2.3 GRAZING MANAGEMENT

The proposed Genesis Project lies entirely within a portion of the TS Allotment that has been closed to livestock grazing. The animal-unit-per month (AUM) allotment associated with this portion of the allotment has been suspended and is not part of the active grazing preference. Therefore, no reduction in grazing or additional suspension of AUMs due to the proposed Project would be required.

3.2.4 LAND USE AND ACCESS

During the last two decades, land use in the Genesis Project area has changed from ranching and grazing to predominantly mining. Since the early 1980s, access to rangeland in the Project area has been restricted due to concentrated mine exploration and development. Existing access into the Project area is controlled by Newmont and would not be affected by the Proposed Action.

3.2.5 VISUAL RESOURCES

The proposed Genesis Project is located in an Interim Visual Resource Management (VRM) Class IV area. Class IV VRM objectives provide for management activities which allow major modification of the

existing landscape. Mining and related activities have been ongoing in the Project area for over 20 years. The Proposed Action would minimally modify present visual characteristics of the land because of existing extensive mining operations.

3.2.6 NATIVE AMERICAN CONCERNS

To date, formal and informal consultation efforts have not identified any specific Western Shoshone Traditional Cultural Properties within or in close proximity to the Genesis Project boundary. Therefore, the Proposed Action would have no effect on Native American Concerns.

3.2.7 CULTURAL RESOURCES

Nine inventories conducted in the Project area have documented and evaluated 21 archaeological sites. Two sites (CrNV-12-1838 and -1839) on the western flank of the Project area (Jaynes 1981, [BLM1-388]) were determined not eligible for listing on the National Register of Historic Places. Correspondence with the State Historic Preservation Officer on file at the Elko District Office tracks specific discussions regarding the large but dispersed assemblage that once existed at CrNV-12-1838. Deposition of waste rock has encroached on the former site area.

In the 1990s, a series of block and linear inventories were conducted in the Project area. Newsome and Tipps (1992, [BLM1-1544]) documented the Barite Mine (CrNV-12-10565). This mine reportedly was in operation from 1935 to 1959 and includes a well-preserved head-frame, remains of associated structures, shafts, and prospects. The site is eligible for the National Register under Criteria A and has been preserved during ongoing mining operations in the Project area. New surface disturbance associated with the Proposed Action would not occur within 100 feet of the site.

All remaining sites documented in the Project area have been determined not eligible for the National Register due to a lack of appropriate datasets suitable for augmenting the regional record, lack of assemblage integrity, or the absence of archaeological integrity (i.e., the site has been disturbed by natural or historic-era events). The Proposed Action would have no adverse affect on Cultural Resources.

3.2.8 ENVIRONMENTAL JUSTICE

There are no minority communities known to have a greater amount of negative impacts compared to any non-minority community in the area. Environmental Justice would not be affected.

3.2.9 NOISE

Noise levels associated with the Proposed Action would be similar to noise generated from current and ongoing operations. Existing noise levels would likely continue over the expected twelve-year mine life.

3.2.10 PALEONTOLOGICAL RESOURCES

Paleontological resources have not been identified within the Genesis Project area. In the event vertebrate fossils are discovered within the Project area during mining operations, Newmont would

notify the BLM Authorized Officer. Actions that could occur after notification include cessation of mining activities in the area of discovery; verification and preliminary inspection of the discovery; and development/implementation of plans to avoid or recover the fossils.

3.3 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIVITIES

This section summarizes past, present, and reasonably foreseeable future activities in the proposed Genesis Project area which form the basis for analyzing potential cumulative effects from implementation of the Proposed Action. Descriptions of the collective or additive environmental and social effects of combining past, present, and reasonably foreseeable future activities associated with mining and other land uses in the Project area are also described.

The Council on Environmental Quality (CEQ) defines cumulative impact as:

> "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (1508.7)."

Past, present, and reasonably foreseeable future land uses (e.g., grazing and recreation), activities (mining), and natural phenomena (wildfire) cumulatively affect resources to various degrees over a given area. Cumulative effects are discussed on a resource by resource basis in this section. Resource-specific study areas for cumulative effects (CESAs) are also described and the rationale used to designate the study areas. Where appropriate, figures are provided in each resource description delineating the CESA. Cumulative impact analysis included in this section is based on a twelve-year life-of-mine for the Genesis Project. Cumulative or additive impacts are described for reasonably foreseeable future activities through year 2022.

3.3.1 MINING AND MINERAL DEVELOPMENT

Mine development in the Carlin Trend has affected topography, air and water quality, vegetation, soil, wildlife, and distribution and occurrence of groundwater and surface water in the CESA for each resource. Ore processing in the Carlin Trend has included operation of cyanide heap leach facilities, carbon-in-leach systems, milling of ore, and disposal of tailing. In addition, exploration projects involving drilling, trenching, and sampling are ongoing.

The Proposed Action would require dewatering along the east side of the Genesis Pit; however, this dewatering would be localized in a relatively low permeable siltstone. Regional dewatering for other area mines in the Carlin Trend has lowered groundwater in the carbonate rocks well below the existing and proposed expansion of the Genesis Pit; therefore, no cumulative impacts would occur to resources from dewatering associated with the Proposed Action. Effects of dewatering in the Carlin Trend have been previously disclosed and evaluated in the report Cumulative Impact Analysis of Dewatering and Water Management Operations for the Betze Project, South Operations Area Project Amendment, and

Leeville Project (BLM 2000). Updated water monitoring data and groundwater modeling analysis are provided in the Betze Pit Expansion Project Draft Supplemental Environmental Impact Statement (BLM 2008a), and Leeville and SOAPA Draft Supplemental EIS documents (BLM 2007a, 2007b).

3.3.1.1 Past and Present Activities

Mining activities in the cumulative effects area include exploration (e.g., drilling, trenching, and sampling), development of underground mines, open-pit mining, waste rock disposal, ore milling and processing, tailing disposal, heap leaching, dewatering/discharging, and reclamation.

Existing mining and exploration sites in the Carlin Trend are shown on **Figure 3-1**. Boundaries shown for the mining operations delineate administrative areas within which disturbance has occurred or is authorized to occur. These boundaries represent the outer limits of major surface disturbance but do not imply that all areas within the boundaries would be disturbed. Disturbance associated with each mine is shown in **Table 3-1**. The 43 acres of proposed new disturbance associated with the Genesis Project represents 0.13 percent of past and present mining and exploration areas in the Carlin Trend.

3.3.1.2 Reasonably Foreseeable Future Activities

Mine development and exploration projects are expected to continue in the foreseeable future in the Carlin Trend. Reasonably foreseeable future mining operations in the Carlin Trend from 2010 through 2022 are detailed in **Table 3-1**. Operations beyond year 2022 are too speculative to consider in this analysis because of the large number of variables involved, including the price of gold.

3.3.2 ENERGY PRODUCTION AND DISTRIBUTION

3.3.2.1 Past and Present Activities

Construction of the TS Power Plant located three miles north of Dunphy in Eureka County, Nevada was completed in early 2008 and began commercial operations in June, 2008. The power plant consists of a pulverized coal-fired generator with a name plate generating capacity of 242 MW, fueled by low-sulfur, sub-bituminous coal. The plant includes state-of-the-art emission controls including low nitrogen oxide (NO_x) burners, overfire air and selective catalytic reduction for control of NO_x; spray dry absorber for control of sulfur dioxide (SO_2); powder activated carbon injection to collect mercury from the flue gas, and a fabric filter baghouse for particulate control.

The TS Power Plant was developed for the specific purpose of providing electric power to Newmont's gold mining and ore processing operations at various locations across northern Nevada. Current peak loads to serve Newmont's operations range from 180 to 190 MW. The TS Power Plant supplies approximately 130 MW for Newmont operations in the Nevada Energy Power Company service area. Excess annual capacity is made available to the Nevada Energy Power Company system. A new 120 KVA transmission line has been constructed from the power plant to the Falcon substation located about seven miles north of the plant, where power is distributed into the Nevada Energy transmission grid.

TABLE 3-1
Past, Present, and Reasonably Foreseeable Future Mining Related Disturbance[1]
Carlin Trend

Map[2] Reference No.	Facility	Existing Disturbance (acres)	Future[3] Disturbance (acres)	Comment
1	Newmont/Rodeo Creek Gold-Hollister	283	100	Foreseeable underground gold mine. Same location as the Hollister Development Block Project.
2	Hecla - Hollister Development Block	51		
3	Halliburton-Rossi	373	584	Rossi mine expansion of Queen Lode and Sage Hen areas and may include expansion of open pits and waste rock dumps.
4	Trio Gold Corp-Rodeo Creek	42		
5	Barrick-Meridian JV-Rossi	51		
6	Barrick-Storm Underground	185		
7	Barrick-Arturo		2,347	Foreseeable future open pit gold mine at the existing Dee Gold Mine.
8	Marigold – Dee Mine	802		
9	Centerra -Ren	30	100	Foreseeable underground mine.
10	Newmont-Bootstrap	1,900		
11	Barrick-Betze/Post-Meikle , Rodeo,Goldbug, (Mill & TSF transferred from Newmont)	9,295		Mine expansion. Expansion includes enlargement of open pit and construction of tailing impoundment.
12	Newmont-Genesis-Bluestar, Section 36, Deep Star, Lantern, North Lantern, Bullion Monarch	2,958	100	Foreseeable future open pit gold mine. Expansion of the Lantern Mine in the Genesis-Bluestar Operations Area.
	Newmont Genesis		43	Continued mining of the Genesis Area. Project includes open pit mining, sequential backfill and increased height of existing external waste rock facilities.
	Newmont-North Area Leach	1,426	100	Expansion of the existing heap leach pad.
	Newmont-Carlin Mine/Mill 1, Pete	3,928		
13	Newmont- Leeville	566		
14	Newmont- Chevas	168		
15	Newmont-High Desert	164		
16	Newmont -Mike	48	100	Foreseeable future gold mine project.
17	Newmont- Gold Quarry/SOAP, MC Reservoir, N-S Haul Road	9,961	100	Expansion of Non-property Leach Pad and construction of Property Pad 2 in Section 18.
	Greater Gold Quarry	-	1,424	
	5/6 TSF East Expansion	-	782	
18	Newmont- Woodruff Creek	66		
19	Newmont-Rain	961		
20	Newmont-Emigrant	155	1,418	Proposed open pit mine, heap leach facility and waste rock dump; permitting in progress.
TOTAL		**33,413**	**7,222**	

[1] Projects permitted by BLM as of April 2007. [2] See **Figure 3-1** for disturbance sites. [3] Reasonably foreseeable assumes 100 acres disturbance per plan or plan amendment. Actual disturbance will vary as plans are developed. Source: BLM 2010.

Map Reference No.	Facility
1	Newmont/Rodeo Creek Gold-Hollister/Ivanhoe
2	Hecla- Hollister Development Block
3	Halliburton-Rossi
4	Trio Gold Corp-Rodeo Creek
5	Barrick-Meridian JV-Rossi
6	Barrick-Storm Underground
7	Barrick-Arturo
8	Marigold – Dee Mine
9	Centerra -Ren
10	Newmont-Bootstrap
11	Barrick-Betze/Post , Meikle, Rodeo,Goldbug, (Mill & TSF transferred from Newmont)
12	Newmont-Genesis-Bluestar, Section 36, Deep Star, Lantern, North Lantern, Bullion Monarch
	Newmont Genesis
	Newmont-North Area Leach
	Newmont-Carlin Mine/Mill 1, Pete
13	Newmont- Leeville
14	Newmont- Chevas
15	Newmont-High Desert
16	Newmont -Mike
17	Newmont- Gold Quarry/SOAP, MC Reservoir, N-S Haul Road
18	Newmont- Woodruff Creek
19	Newmont-Rain
20	Newmont-Emigrant

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N

0 5
Miles

Interstate Highway
Other Roads
Area of Current Major Exploration
Areas of Existing and Reasonably Foreseeable Development As Defined By Mine Plan
Locations of Reasonably Foreseeable Mine Developments

Past, Present, and Reasonably Foreseeable Future Mining Activities
Genesis Project
Eureka County, Nevada
FIGURE 3-1

The power plant requires an estimated 4,800 acre-feet of water annually. Water is supplied from production wells located north of the power plant. Assuming a 24-hour power generation cycle, the water demand for the power plant is approximately 2,500 gpm. The plant has a design life of about 50 years.

The TS Power Plant burns approximately 800,000 tons of Powder River Basin coal annually. Coal is delivered to the site via 130-car unit trains. During full load operations, one train load (approximately 15,000 tons) of coal is delivered to the site about every five days (Laybourn 2009).

3.3.2.2 Reasonably Foreseeable Future Activities

Ruby Pipeline, L.L.C. has proposed to construct and operate a 675-mile long buried natural gas pipeline extending from southwest Wyoming, across Utah, Nevada, and terminating near the Oregon – California border. The pipeline would be located about 15 to 20 miles north of the Carlin Trend and constructed within a 115-foot wide corridor. The Project would be constructed across 97 miles of public land administered by BLM and 70 miles of private land within Elko County, Nevada. A compressor station (Wieland Flat) would be constructed about 35 miles north of Elko, Nevada.

Construction would involve stripping and stockpiling growth media; trenching; placement and burial of a 42-inch diameter steel pipeline in a six-foot deep trench; replacement of growth media; and regrading and revegetation of disturbed areas. The Project is scheduled to begin in February 2010 with completion projected by March 2011. Ruby Pipeline estimates that 400 to 700 workers would be required to construct the pipeline and Wieland Flat Compressor Station in Elko County (FERC 2009).

3.3.3 WILDFIRES AND RESEEDING

3.3.3.1 Past and Present Activities

Over the last decade, the BLM Elko District Office averaged 150 fires per season that burned approximately 100,000 acres. As shown on **Figure 3-2**, approximately 38 percent (941,793 acres) of wildlife and livestock grazing habitat in the Cumulative Effects Study Area has been impacted by fire between 1999 and 2008. This includes 116,000 acres that burned more than once during the period (BLM 2007a, 2007b).

Since 1992, public and private entities have worked to restore range habitat for wildlife and livestock on areas affected by wildfire. Some tracts of land are reseeded and others are allowed to reseed naturally (either through recovery of burned plants or under natural release of seeds from adjacent areas).

Critical habitat areas are being reseeded with forbs, grasses, and shrubs that compete with invasive grasses such as cheatgrass, which is prevalent in northern Nevada. Habitat restoration/reseeding projects from 1999 through 2008 resulted in reseeding a total of 382,787 acres (55,328 acres private and 327,459 acres public) and are shown on **Figure 3-3** (BLM 2007a, 2007b, 2008a).

3.3.3.2 Reasonably Foreseeable Future Activities

Fire (controlled burns and wildfire) will continue to be an important component of land management for public and private landowners. Controlled burns will be used to reduce fuel load in selected areas of public land. Wildfires are expected to continue at levels similar to the past few years. Some of this acreage would likely include areas previously burned and seeded.

3.3.4 STABILIZATION AND REHABILITATION PROGRAMS

3.3.4.1 Past and Present Activities

Beginning in 1991, BLM in cooperation with Barrick, Newmont, and others developed comprehensive mitigation plans for mining-related impacts. Many aspects of the mitigation plans are focused in the Carlin Trend and specifically in the Maggie, Willow, and Rock creek drainage basins; however, some mitigation projects have been implemented in other parts of the region. Various mitigation plans and rehabilitation projects have been implemented including the following:

Mitigation Plans

- Barrick Conservation and Mitigation of Riparian/Wetland Areas – 1991 Betze Project.
- Mitigation Plan for 1993 South Operations Area Project (SOAP).
- Mitigation Plan for 2002 South Operations Area Project Amendment (SOAPA).
- Mitigation Plan for 2002 Leeville Project.
- Mitigation Plan for 2003 Betze Project.
- Susie Creek Riparian Restoration Project.
- Mitigation Plan for 2009 Betze Expansion Project.

Other Projects and Programs

In addition to the mitigation plans described above, several projects and programs have been implemented to restore habitat for wildlife and riparian areas and/or manage livestock and wildlife within and adjacent to the Carlin Trend. Primary programs and projects include the following:

- Mule deer transition range seeding.
- T Lazy S sage grouse habitat improvements.
- Trout Unlimited Strategies for Restoring Native Trout Program – Maggie and Willow Rock Creek Drainages.
- Open Range Consulting - Evaluation of Factors Affecting Lahontan Cutthroat Trout in Three Watersheds.
- Barrick Upper Willow Creek Enhancement Plan.
- Beaver Creek Riparian Pasture.
- Carlin Trend Mule Deer Habitat Management Plan (under development).

The above mitigation plans and rehabilitation projects are on file at the Elko District BLM Office and are described in the Betze Pit Expansion Project Draft Supplemental Environmental Impact Statement (BLM 2008a), and Leeville and SOAPA Draft Supplemental EIS documents (BLM 2007a, 2007b).

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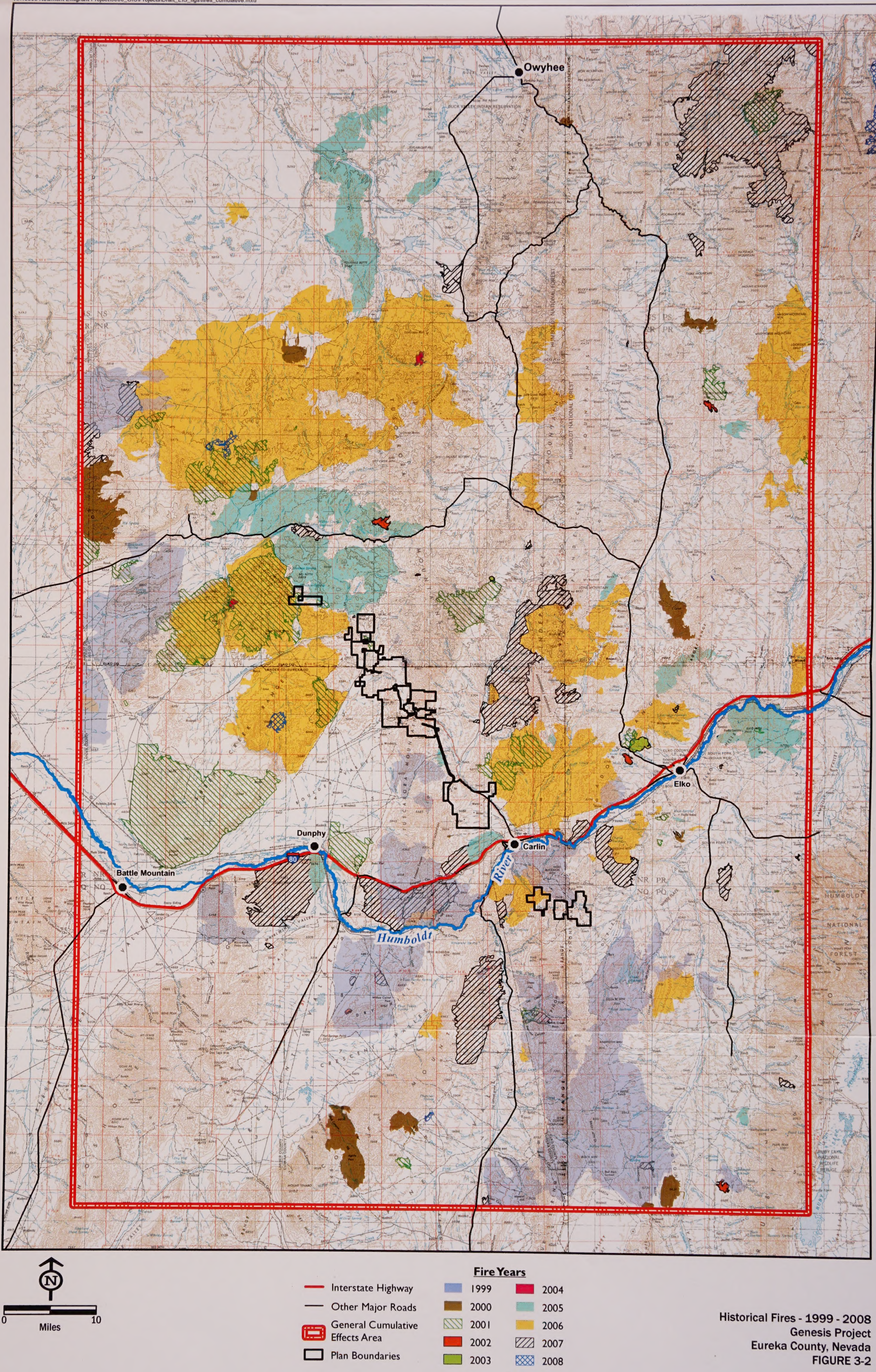

Historical Fires - 1999 - 2008
Genesis Project
Eureka County, Nevada
FIGURE 3-2

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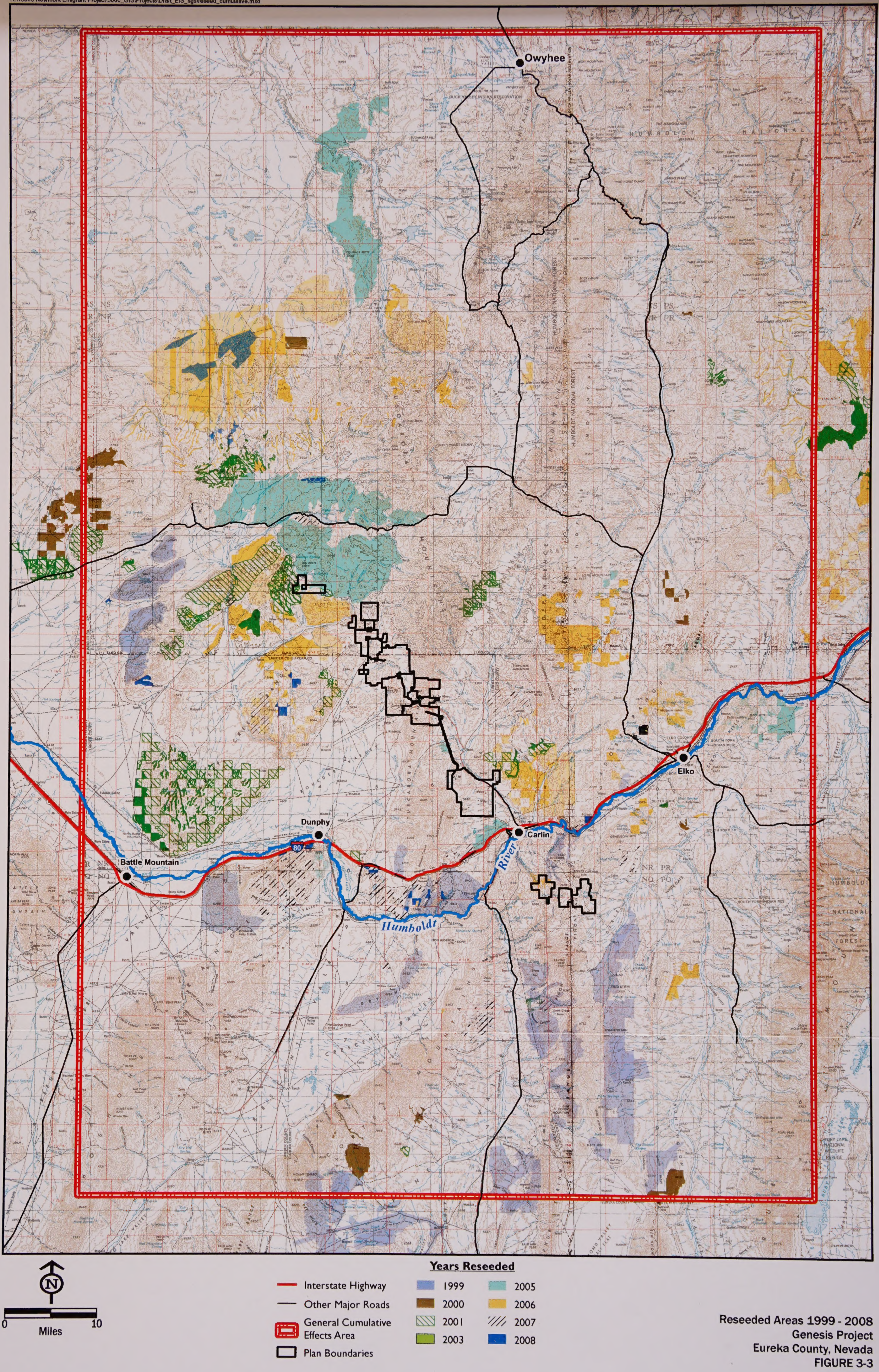


Reseeded Areas 1999 - 2008
Genesis Project
Eureka County, Nevada
FIGURE 3-3

Groundwater model predictions completed during past permit reviews for mining operations in the Carlin Trend indicate that approximately 618 acres of riparian and wetland habitat within Maggie Creek could be impacted by regional mine dewatering. With the exception of reduced flow in Maggie Creek narrows and drying of a few springs, predicted impacts to riparian areas and wetlands have not yet occurred (BLM 2007a, 2007b, 2008a).

Habitat restoration has resulted in lengthening Maggie Creek approximately 1.8 miles (due to increase in stream sinuosity) and increasing riparian habitat by 193 acres (Open Range Consulting 2007). Restoration work completed in the Upper Willow Creek/Rock Creek drainage in Boulder Valley has resulted in watershed improvements for terrestrial and aquatic organisms in riparian habitats. Seepage from the TS Ranch Reservoir located in Boulder Valley has resulted in formation of three springs (Green, Knob, and Sand Dune) in the valley; wetland/riparian areas created by these springs total approximately 1,200 acres. Flow from these three springs will be reduced or become intermittent when water is no longer available from mine dewatering at the TS Ranch Reservoir. When this occurs, wetlands or riparian areas created by these springs will eventually dry up and wildlife riparian habitat will no longer be available.

3.3.4.2 Reasonably Foreseeable Future Activities

Programs to improve stream and riparian habitat through livestock grazing management practices and restoration of riparian areas, and programs to increase habitat for mule deer, sage grouse, and other wildlife are expected to continue. Many of these programs are implemented by mining companies to offset losses of habitat that could occur as a result of operations and mine development. Other programs are implemented to restore vegetation and habitat in areas impacted by fire.

3.3.5 LAND DEVELOPMENT

3.3.5.1 Past and Present Activities

Platting of residential subdivisions in Elko County has primarily occurred through subdivision of land previously used for agricultural purposes. Numerous subdivisions platted in the 1960s, prior to NRS subdivision law, did not provide legal access, roads, or utilities. Many of these subdivisions to date have not been developed. Most residential development has occurred within the incorporated boundaries of Elko and surrounding areas, such as Spring Creek, South Fork, Lamoille, areas directly adjacent to the City of Elko, or along the Interstate 80 corridor (Elko County Nevada Water Resource Management Plan 2007).

Approximately 565 acres have been platted for development in the vicinity of Carlin. The majority of platted area lies between Interstate 80 and the Humboldt River in and adjoining the town of Carlin. Other development is occurring east of Highway 766 near its intersection with Interstate 80 (Newmont 2007c).

Approximately 23 acres have been platted at Palisades, midway between Carlin and Dunphy. Development in the Dunphy area consists of approximately six acres (Newmont 2007c). Information concerning the level and stages of these developments is not available.

3.3.5.2 Reasonably Foreseeable Future Activities

Demographic data concerning population provided by the State of Nevada predict a decrease in population and a loss of agricultural land in Elko County over the next 25 years. In contrast, Elko County indicates an increase in population and sustained agricultural land use (Elko County Nevada Water Resource Management Plan 2007).

3.3.6 HAZARDOUS MATERIALS/SOLID AND HAZARDOUS WASTE

3.3.6.1 Past and Present Activities

Hazardous Materials

In addition to the hazardous materials listed for Newmont's Carlin Trend Operations areas in **Table 2-4** in Section 2.3.11.1 - Hazardous Materials/Solid and Hazardous Waste, hazardous materials used and stored on-site by other operators in the Carlin Trend are shown in **Table 3-2**.

Solid Waste

All non-hazardous solid waste generated through operations in the Carlin Trend is disposed in NDEP-approved Class III waivered landfills established at the mine sites.

TABLE 3-2
Hazardous Materials Used and Stored
Carlin Trend

Substance	Barrick		Rodeo Creek Gold, Inc.	
	Annual Use	Stored On-site(s)	Annual Use	Stored On-site(s)
Diesel Fuel	16,599,189 gals	85,000 gals	510,000 gals	30,000 gals
Gasoline	376,539 gals	10,500 gals	7,100 gals	5,000 gals
Hydraulic Oil	NA	NA	2,000 gals	500 gals
Motor Oil	41,000 gals	NA	2,000 gals	500 gals
Antifreeze	45,000 gals	27,000 gals	3,600 gals	220 gals
Explosives	NA	NA	115,720 lbs	NA
Prill	18,731 tons	217 tons	8,000 lbs	NA
Propane	17,521,843 gals	2,705,854 gals	NA	NA
Grease	NA	NA	NA	NA
Cyanide	10,508,640 lbs	580,010 lbs	NA	NA
Lime	290,657 tons	4,150 tons	NA	NA

gals. = gallons; lbs = pounds; NA = Not Available
Source: Barrick 2007a. Rodeo Creek Gold 2008.

Hazardous Waste

Newmont's South Operations Area (Gold Quarry Mine) and Barrick's Betze/Post Mine currently operate as Large Quantity Generators of hazardous waste as defined by the RCRA. These facilities generate more than 1,000 kilograms per month of RCRA-regulated hazardous waste (40 CFR Part 260-270). All hazardous wastes currently generated at the mines are managed according to existing, approved permits or are disposed of according to local, state, or federal regulations.

Hazardous waste streams associated with mining and ore processing in the Carlin Trend are shown in **Table 3-3**. These wastes are accumulated and stored at designated sites at each mine operation and periodically transported to one of two Clean Harbors Treatment, Storage, and Disposal (TSD) facilities in Utah. All hazardous wastes are stored, packaged, and manifested in compliance with applicable federal and state regulations.

3.3.6.2 Reasonably Foreseeable Future Activities

Reasonably foreseeable projects in the Carlin Trend would result in similar volumes of solid and hazardous wastes stored on site, transported on state and federal highways, and disposed of at approved sites. The volumes of solid and hazardous wastes transported are expected to remain at current levels.

Production levels for mills and heap leach operations are expected to be optimized for the foreseeable mine expansions and developments. The volume of hazardous materials (primarily diesel fuel) transported, stored, consumed, and disposed would likely increase as a result of continued mining operations at the Genesis Project.

Expansion of Barrick's Betze operations would extend the life-of-mine; production of ore and use of hazardous materials would remain at current levels but extend over an additional four to five years. Hazardous materials that would be stored and used at the proposed Emigrant Mine and Rodeo Creek Gold's Hollister Development Block are included in **Table 3-4**.

TABLE 3-3
Hazardous Waste Streams
Carlin Trend Operations

Waste Stream	Generator	EPA Hazardous Waste Code	Treatment, Storage, Disposal Facility	Generation Rate
Newmont Operations				
Paint-related material	Mill 6	D001, F003	Clean Harbors by Incineration	1,100 gals
Mercury PPE/debris	Mill 6	D009	Clean Harbors by HW Landfill	31,600 lbs
Spent MIBK	Assay Lab.	D001, D002	Clean Harbors by Incineration	350 lbs
Mercuric/Mercurous chloride	Mill 6	D009, D002	Air Pollution Control on Roaster in HW Landfill	42,000 lbs

TABLE 3-3
Hazardous Waste Streams
Carlin Trend Operations

Waste Stream	Generator	EPA Hazardous Waste Code	Treatment, Storage, Disposal Facility	Generation Rate
Mercury Solids	Mill 6	D009	Clean Harbors by HW Landfill	4,000 lbs
Solvents	Mills, Leach	D001, F003	Clean Harbors by Incineration	1,100 gals
Hydrochloric, Sulfuric acid	Mills, refinery	D002	Clean Harbors by Incineration	5,000 lbs
Caustic solutions	Mills	D002	Clean Harbors by HW Landfill	2,000 lbs
Lab packs	Mills, Lab	Varies	Clean Harbors/varies	500 lbs
Lead-bearing waste	Assay Lab	D008	Clean Harbors by HW Landfill	25,000 lbs
Halogenated oil	Mills	F002	Clean Harbors by Incineration	3,000 gals
Vanadium pentoxide catalyst	Mill 6	D009	Clean Harbors by Incineration	28,500 lbs
Barrick Operations				
Aerosol can waste, filters, paint filters	Property wide	D001,D005, D008, D018, D029,D035, D039, D040, F002, F003, F005	Clean Harbors by Incineration	1,440 lbs
Waste paint and related material	Property wide	D001,D004, D007, D008, D009,D039, F002, F003, F005	Clean Harbors by Incineration	1,120 lbs
Debris contaminated with used oil and tetrachloroethyne	Property wide	D039	Clean Harbors by Incineration	240 lbs
Inorganic lab waste	Lab	D008	Clean Harbors by Incineration	92.82 tons
Computer equipment	Property wide	D008	Clean Harbors/Metal recovery including retorting, smelting, chemical	17.11 tons
Baghouse dust from assay lab	Lab	D008	Clean Harbors by HW Landfill	5.07 tons
Brick, mortar , and soil	Autoclave	D008	Clean Harbors by HW Landfill	9.59 tons
HEPA filters and debris	Processing and Refining	D008	Clean Harbors by HW Landfill	7.12 tons
Used oil	Property wide	D039, D040	Clean Harbors by Incineration	17.5 tons
Used solvent	Property wide	D001	Clean Harbors by Incineration	440 lbs
Waste lead/acid batteries	Property wide	D002, D008	Clean Harbors by other treatment	400 lbs

TABLE 3-3
Hazardous Waste Streams
Carlin Trend Operations

Waste Stream	Generator	EPA Hazardous Waste Code	Treatment, Storage, Disposal Facility	Generation Rate
Lead contaminated sandblast grit	Property wide	D008	Clean Harbors by HW Landfill	4.5 tons

EPA - Environmental Protection Agency; TSDF = Treatment, Storage, or Disposal Facility; gals = gallons; lbs = pounds; PPE = Personal Protection Equipment; HW = Hazardous Waste; MIBK = Methyl Isobutyl Ketone

[1] Laboratory Clean-out Chemical Wastes

Source: Barrick 2006; Newmont 2007d.

TABLE 3-4
Hazardous Materials Management
Emigrant and Hollister Projects

Substance	Area Used/Stored	Rate of Use (per year)	Quantity Stored On-Site	Storage Method	Waste Management
Emigrant Project					
Diesel Fuel	Mine/truck shop	5,300,000 gals	35,000 gals	Bulk tank	No waste
Hydraulic Fluid	Mine/truck shop	-	5,000 gals	Bulk tank totes, drums	Recycled
Motor Oil	Mine/truck shop	-	5,000 gals	Bulk tank totes, drums	Recycled
Antifreeze	Mine/truck shop	-	5,000 gals	Bulk tank totes, drums	Recycled
Explosives	Prill Silo	8,000,000 lbs	370,000 lbs	Silo	No waste
	Explosive (powder) magazine	50 tons	2,500 lbs	Magazine	No waste
Gasoline	Mine/truck shop	-	5,000 gals	Bulk tank	No waste
Propane	Mine/surface	-	5,000 gals	Bulk tank	No waste
Grease	Mine/truck shop	-	1,000 gals	Totes, drums	Recycled
Cyanide	Leach Pad	8,200,000 lbs	7,000 gals	Bulk tank	No waste
Lime	Heap Leach Facility/Lime silo	26,000 tons	250 tons	Silo	No waste
Rodeo Creek Gold (Hollister Development Block)					
Diesel Fuel	Mine/truck shop	510,000 gals	30,000 gals	Bulk tank	No waste
Gasoline	Mine/truck shop	7,100 gals	5,000 gals	Bulk tank	No waste
Antifreeze	Mine/truck shop	3,600 gals	220 gals	Drums	Recycled
Caustic Soda	Water Treatment & Desilting Plant	800 gals	2,400 gals	Bulk tank	No waste
Naphia	Maintenance Shop	500 gals	55 gals	Drum	Recycled
Sulfuric Acid	Water Treatment & Desilting Plant	38,400 gals	1,650 gals	-	-
Lime	Water Treatment & Desilting Plant	20,000 lbs	47,000 lbs	-	-

TABLE 3-4
Hazardous Materials Management
Emigrant and Hollister Projects

Substance	Area Used/Stored	Rate of Use (per year)	Quantity Stored On-Site	Storage Method	Waste Management
Hydrochloric Acid	Water Treatment & Desilting Plant	800 gals	300 gals	-	-
Concrete Stripper (CS-141)	Surface Containment Area	55 gals	55 gals	Drum	-
Chemco #1-degreaser	Maintenance Shop	55 gals	55 gals	Drum	-
Ammonium Nitrate and Fuel Oil (ANFO)	*	*	*	*	No waste

gals = gallons; lbs = pounds; * = information available from Department of Homeland Security.
Source: BLM 2008b; Rodeo Creek Gold 2008.

3.4 RESOURCES EVALUATED IN THE EIS

3.4.1 AIR QUALITY

3.4.1.1 AFFECTED ENVIRONMENT

The proposed Genesis Project is located entirely within the Boulder Flat Air Quality Basin (No. 61-Upper). The Study Area for air quality encompasses the Project area within the Genesis-Bluestar Operations Area (**Figure 3-4**).

Climate

The Genesis Project area, located approximately 20 miles northwest of Carlin, Nevada, is subject to large daily temperature fluctuations, low relative humidity, and limited cloud cover. Wind data collected at the North Area Meteorological Station located approximately one mile northeast of the Project area indicate the most common wind direction is from the southwest and is influenced by diurnal flow resulting from daily heating and cooling of hills and drainage areas. Local topographic features frequently cause wind to flow in the direction of the valley (also known as drainage wind). Average wind speed for the period 1995-2007 is 5.8 miles per hour (Newmont 2008a).

Mean monthly temperatures recorded at the North Area Meteorological Station for the period 1992-2007 vary from 29 to 31°F in December and January, to 73 to 75°F in July and August. Monthly mean minimum and maximum daily temperature values from the Genesis Project area demonstrate that the range of temperatures within a month typically vary by approximately 20° F (Newmont 2008a).

N

0 Feet 2,000

Genesis-Bluestar Operations Area

Township/Range

Sections

Study Area
Genesis Project
Eureka County, Nevada
FIGURE 3-4

Average annual precipitation for the period of 1992–2007 is 12.12 inches. Data collected at the North Area Meteorological Station indicate the heaviest precipitation occurs as snow from November through January, and as rain in May and June. Summer precipitation occurs mostly as scattered showers and thunderstorms that contribute little to overall precipitation (Newmont 2008a). The North Area Meteorological Station is located at a mid-elevation in the Project area given the topography represented by adjacent valley bottoms to mountain ridges.

The amount of precipitation that occurs in an area is influenced by elevation of the landscape. A precipitation gradient develops where an air mass rises from lower elevation in response to mountains or higher elevation areas which typically causes cooling of the air mass, thereby resulting in more precipitation falling at higher elevations. The phenomenon is known as an orographic microclimate and is a function of warmer air holding more moisture than cool air. As air rises and cools, it releases moisture.

Ambient Air Quality Standards

The State of Nevada and federal government have established ambient air quality criteria standards for air pollutants. Criteria pollutants are carbon monoxide (CO), SO_2, particulate matter smaller than 10 microns (PM_{10}), particulate matter smaller than 2.5 microns ($PM_{2.5}$), ozone, and nitrogen dioxide (NO_2).

Ambient air quality standards must not be exceeded in areas accessible to the general public. National primary standards are the levels of air quality necessary, with an adequate margin of safety, to protect public health. National secondary standards are levels of air quality necessary to protect public welfare from known or anticipated adverse effects of a regulated air pollutant.

Attainment status for pollutants within the Project area is determined by monitoring levels of criteria pollutants for which National Ambient Air Quality Standards (NAAQS) and Nevada Ambient Air Quality Standards exist. Standards for PM_{10} are 150 micrograms per cubic meter ($\mu g/m^3$) for a 24-hour average and 50 $\mu g/m^3$ for the annual mean. Ambient monitoring of gaseous emissions (SO_2, CO, NO_x) is not required under air quality permits. Accordingly, no measured data are available to characterize existing air quality. Air quality in Eureka County is classified as attainment or unclassified for all pollutants; no violations of Nevada or national air quality standards have been documented in the region.

Newmont has obtained a Class II Air Quality Operating Permit (AP 1041-0402.02) from the Nevada Bureau of Air Pollution Control for the North Operations Area which includes the proposed Genesis Project and Genesis-Bluestar Operations Area. A Class II permit is issued for facilities that: 1) emit less than 100 tons/yr of any one regulated pollutant; 2) less than 25 tons/yr total hazardous air pollutants; and 3) less than ten tons per year of any single hazardous air pollutant. As NDEP and NBAPC do not require air quality monitoring or modeling to maintain the Class II Air Quality Operating Permit (AP 1041-0402.02), no recent air quality monitoring or modeling has been conducted.

On July 18, 1997, EPA promulgated a revised National Ambient Air Quality Standard (NAAQS) for $PM_{2.5}$. The effective date of this rule is November 21, 2008 which requires states to complete a State Implementation Plan to implement $PM_{2.5}$ rules. The State of Nevada has submitted a plan to comply with

the 1997 ($PM_{2.5}$) NAAQS, but as of the date of this document the EPA has not acted on the plan. The Genesis Project is located within an area classified by NDEP as an Attainment Area indicating air pollution levels in the area do not exceed ambient standards.

No estimate of $PM_{2.5}$ emissions has been required by NDEP during permit review for any of the mines in the Carlin Trend because the current EPA emission estimating guidance for metallic minerals processing (AP 42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Volume I, Chapter 11: Mineral Products Industry, Section 11.24 Metallic Minerals Processing (08/82)) contains no estimating factors for fine particle emissions. Metallic mineral processing produces few $PM_{2.5}$ emissions, as primary fine particle emissions typically are produced from sources such as diesel engines, wood burning activities, and other industrial and commercial combustion processes. Currently, NDEP requires conformance with PM_{10} standards.

Refractory ore mined at the Genesis Project would be processed at Newmont's Refractory Ore Treatment Plant (Mill 6) in the South Operations Area. Processing of refractory ore would result in emissions of SO_2, hydrogen sulfide, sulfuric acid mist, and particulate sulfur. Emissions from Mill 6 and other sources in the South Operations Area are regulated under Class I Air Quality Operating Permit No. 1041-0793 issued by NDEP. All emissions are in compliance with the NDEP permit and do not represent an environmental concern.

Prevention of Significant Deterioration Classification

The area surrounding the proposed Genesis Project is a designated Class II area as defined by the federal Prevention of Significant Deterioration of Air Quality program. The Class II designation allows moderate growth or degradation of air quality within certain limits above baseline air quality. Industrial sources proposing construction or modifications must demonstrate that emissions would not cause deterioration of air quality in all areas. Standards for deterioration are stricter for Class I areas than Class II areas. The nearest Class I area is the Jarbidge Wilderness, located approximately 50 miles northeast of the proposed Genesis Project. As a federal mandatory Class I area, the Jarbidge Wilderness receives visibility protection through the air quality permitting process. No designated Integral Vistas (a view perceived from within the mandatory federal Class I area of a specific landmark or panorama located outside the boundary of the mandatory Class I area) are associated with the Jarbidge Wilderness (BLM 2002).

Two other wilderness areas are located in the Humboldt National Forest southeast of the Project area: East Humboldt Wilderness and Ruby Mountain Wilderness. Neither of these wilderness areas are mandatory federal Class I airsheds. BLM manages ten Wilderness Study Areas in the Elko District, of which seven (all or portions of) have been recommended for wilderness designation. None of these Wilderness Study Areas are mandatory Class I airsheds (BLM 2008b).

Climate Change

On-going scientific research has identified the potential impacts of "greenhouse gas" (GHG) emissions on global climate, including carbon dioxide (CO_2), methane, nitrous oxide, water vapor, and several trace gasses. Through complex interactions on a regional and global scale, these GHG emissions can cause a net warming effect of the atmosphere (making surface temperatures suitable for life on Earth),

primarily by decreasing the amount of heat energy radiated by the Earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), recent industrialization and burning of fossil carbon sources have caused CO_2 concentrations to increase, and are likely to contribute to overall climatic changes, typically referred to as global warming. Increasing CO_2 concentrations also lead to preferential fertilization and growth of specific plant species.

Depending on where measurements are reported, some scientists believe global mean surface temperatures have increased nearly 1°C (1.8°F) from 1890 to 2006 (Goddard Institute for Space Studies 2007). The Intergovernmental Panel on Climate Change (IPCC 2007) and National Academy of Sciences (2006) indicated that by year 2100, global average surface temperatures could increase 1.4 to 5.8°C (2.5 to 10.4°F) above 1990 levels, but also indicated that there are uncertainties in the modeled results, especially regarding how climate change may affect different regions. Observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Northern latitudes (above 24° N) have exhibited temperature increases of 1.2°C (2.1°F) since 1900, with nearly a 1°C (1.8°F) increase since 1970. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures. Without additional meteorological monitoring systems, it is not possible to determine the spatial and temporal variability and change of climatic conditions.

The assessment of GHG emissions and climate change is in its formative phase; therefore, it is not yet possible to know with confidence the net impact to climate. The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts. Historically, the Study Area is represented by cold, wet winters, where precipitation is heaviest in the fall, winter, and spring (November through May) and hot, dry summers, when precipitation is lightest (June through October) (Western Regional Climate Center [WRCC] 2009).

3.4.1.2 DIRECT AND INDIRECT IMPACTS

Proposed Action

<u>Gaseous Emissions</u>

The Genesis Project would be a source of gaseous air pollutants including SO_2, CO, NO_x, and volatile organic compounds (VOCs). The primary source of these emissions would be exhaust from diesel engines used to power mining equipment and haul trucks. Emissions of SO_2, CO, or NO_x are regulated by NDEP, ambient monitoring is not required under air quality permits. Gaseous emissions from diesel engines would be minimized through proper operation and maintenance of mining equipment.

In addition to regulated gaseous emissions, CO_2, an unregulated gas, is produced during consumption of diesel fuel by mining equipment. Under the Proposed Action, Newmont estimates that approximately 5.87 million gallons of diesel fuel would be consumed annually emitting about 65,000 tons of CO_2. An additional 1,366 tons of CO_2 would be emitted hauling 3.0Mcy of growth media from the East Lantern Waste Rock Disposal facility to the Genesis Project.

Ammonium nitrate and fuel oil (ANFO) are used as blasting agents and would be a source of gaseous pollutants. The use of ANFO can result in uncontrolled fugitive emissions of NO_x, CO, and SO_2.

Particulate Emissions

Existing mining and exploration operations in the Project area produce criteria pollutant emissions, most notably from particulate matter. Emissions of particulate matter measuring ten microns (PM_{10}) are the prevalent type of air pollutant associated with mining activities in the Carlin Trend. Fugitive particulate matter emissions are created during drilling, blasting, crushing, and hauling rock, and road dust. The North Operations Area is designated as a minor source (potential to emit less than 100 tons/yr) of fine particulate matter.

Fugitive dust emissions would be generated from wind erosion of disturbed areas and road dust. Haul roads would be maintained on a continuous basis for safe and efficient haulage and to minimize fugitive dust emissions. Generation of fugitive dust from ore handling activities would be controlled using BMPs (Nevada State Conservation Commission 1994) which could include direct water application, use of approved chemical binders or wetting agents, water spray, and revegetation of disturbed areas concurrent with operations. There would be no expected increase above existing permitted emissions.

Mercury Emissions

The Nevada Mercury Air Emissions Control Program adopted in 2006 requires reporting of mercury emissions from stationary sources that process gold or silver ore (NAC 445B.2 – 445B.41). Mercury emissions from Newmont's South Operations Area (Gold Quarry) are subject to controls listed in NAC 445B.3651 as constituting presumptive Nevada Maximum Achievable Control Technology for controlling mercury emissions from these processes under Nevada's Mercury Air Emissions Control program. Newmont's Mill 6 roasting facility has implemented emission controls for mercury. Average mercury content of ore from Newmont's current and reasonably foreseeable mining operations include: Chukar (4.43ppm); Gold Quarry (6.90ppm); Genesis (4.80ppm); Leeville (17.54ppm); and Emigrant (4.00ppm) (Newmont 2008b). Under the Nevada Mercury Control Program, Newmont reported 422 pounds of mercury emissions to the Bureau of Air Quality Planning from all point sources at Gold Quarry including ore processed at Mill 6 from three operations (Chukar, Gold Quarry, and Leeville) during 2008 (NDEP 2009).

Approximately 4Mt of run-of-mine oxide ore associated with the Genesis Project would be placed annually on Newmont's North Area Leach Facility (a total of 48Mt over the twelve-year life-of-mine). A small amount of mercury would load to the carbon columns during the leaching circuit each year of operation. The impregnated carbon would be shipped to the Mill 5/6 complex for stripping and recovery of gold, silver, and mercury. The carbon regeneration procedure also results in recovery of mercury.

Approximately 837,500 tons of refractory ore from the Genesis Project would be shipped annually to the South Operations Area Mill 6 for roasting. A total of 6.7Mt of refractory ore would be mined and processed during an eight year period (**Table 2-3**) within the twelve-year Project life. Based on the average mercury content of Genesis ore indicated above, approximately 8,040 lbs of mercury would be associated with the refractory ore processed at Mill 6.

Emission factors based on 2008 source testing (Newmont 2009b) for Newmont's South Operations Area indicates that 99.89 percent of the mercury present in the ore is retained or removed through emission controls at the roaster and carbon regeneration. As a result, the average annual mercury

emissions from 46,440 lbs of available mercury (38,400 lbs associated with leach ore and 8,040 lbs associated with refractory ore) would be 51.2 lbs. Given that the mercury content of Genesis Project ore is low (4.8 ppm) compared with other ore sources, when combined with control technology, processing Genesis refractory ore as a batch or blended with other ore would not increase annual mercury emissions from the Mill 5/6 facility, but would extend the period of emissions and increase the total amount of mercury emitted from Mill 5/6.

Figure 3-5 portrays the deposition values for mercury from ore generated from the Genesis Project that would be processed at Newmont's Mill 6 Facility. The deposition values are represented in concentric circles, with the highest value portrayed as 0.10 gram per square kilometer per year ($g/km^2/yr$) about 20 km northwest of Mill 6, and decreasing in increments of 0.25 $g/km^2/yr$ to the lowest predicted total deposition value of 0.01 $g/km^2/yr$ about 50 km northwest of the specified source. The Environmental Protection Agency (EPA) modeled mercury background using the EPA Regional Modeling System for Aerosols and Deposition (REMSAD), including the global pool value for Nevada, is 11.1 $g/km^2/yr$.

No Action Alternative

Potential direct and indirect impacts resulting from implementation of the Proposed Action to air resources would be avoided with selection of the No Action Alternative. Emission sources associated with ongoing operations at the Genesis-Bluestar Operations Area would continue under approved permits. Newmont does not anticipate processing any refractory ore during the remaining mine life under authorized operations, therefore there would be no mercury emissions from Mill 6 attributable to ore mined at the Genesis-Bluestar Operations Area. Approximately 370,000 gallons of diesel fuel would be consumed during the remaining mine life emitting about 4,100 tons of CO_2. A small amount of mercury contained within the Genesis ore will report to the leaching circuit and will be processed in Mill 5/6. This is a continuation of ongoing operations.

3.4.1.3 CUMULATIVE EFFECTS

The CESA for analyzing potential cumulative effects of emissions on air quality encompasses three air basins: Basin 51 (Maggie Creek Basin); Basin 52 (Marys Creek Basin); and Basin 61 (Boulder Flat Basin). These basins contain the northern portion of the Carlin Trend (north of Interstate 80) and emission sources in immediately adjacent areas. These air basins are congruent with hydrographic basins depicted in the surface water drainages figure in Section 3.4.3 - Water Quantity and Quality.

PM_{10}, CO, NO_x and SO_2 Emissions

Cumulative effects from mining and power generation operations were evaluated from a total of 338 emission sources through modeling of five facility groups in the Carlin Trend area. The EPA-approved AMS/EPA Regulatory Model (AERMOD) (Version 07026) was used to conduct the air quality analysis. Trinity Consultants' BREEZE AERMOD GIS Pro v6.1.6 modeling manager was used to prepare the input files and manage AERMOD processing. The model was run using elevated terrain, PRIME building downwash algorithms, and EPA regulatory defaults. **Table 3-5** summarizes emission sources considered in the cumulative air quality modeling analysis (Environmental Management Associates (EMA) 2007).

TABLE 3-5 Summary of Emission Sources Included in Air Quality Modeling					
Facility	Number of Model Sources	Emissions of PM_{10} (tons/yr)	Emissions of CO (tons/yr)	Emissions of NO_x (tons/yr)	Emissions of SO_2 (tons/yr)
SOAPA	84	568	337	354	276
Leeville	7	0.5	0	0	0
North Operations Area (includes Genesis) without Leeville	40	93.8	0	0	0
Betze/Post	179	579	400	311	996
TS Power Plant	28	598	744	1.170	1,546
TOTAL	338	1,840	1,480	1,835	2,818

tons/yr = tons per year; PM10 = particulate matter smaller than 10 microns; CO = carbon monoxide; NOx = nitrogen oxides; SO2 = sulfur dioxide. Source: EMA 2007.

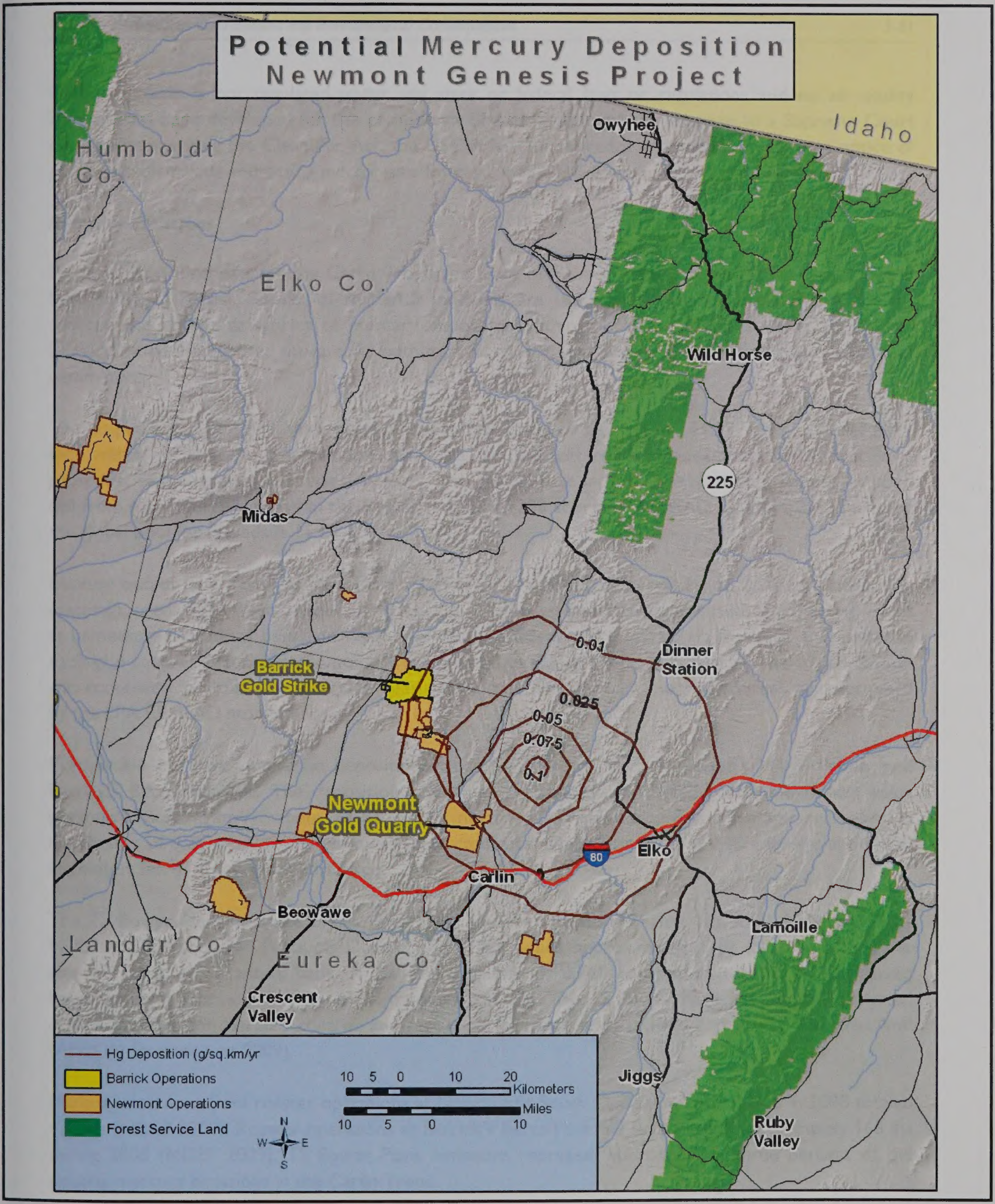
Modeling conducted by EMA (2007) for PM_{10}, CO, NO_x, and SO_2 emissions indicated that cumulative emissions from these sources do not violate ambient Nevada First-High Standards. Modeling results are contained in the Air Quality section of the Leeville Draft Supplemental EIS (Tables 3-3, 3-4, and 3-5, BLM 2007a). Reasonably foreseeable future activities associated with these facilities would be conducted in accordance with current and future NDEP authorization and State of Nevada standards.

Greenhouse Gas (GHG)

Although the Earth's atmosphere consists mainly of oxygen and nitrogen, neither plays a major role in enhancing the greenhouse effect because both are essentially transparent to terrestrial radiation. The greenhouse effect is primarily a function of the concentration of water vapor, CO_2, and other trace gases (methane, nitrous oxide, and ozone) in the atmosphere that absorb the terrestrial radiation leaving the surface of the Earth (IPCC 1996). Although these gases occur naturally in the atmosphere, man-made sources have increased emissions of GHGs over the past decades. Of the man-made GHGs, the greatest contribution currently comes from CO_2 emissions.

Activities in Nevada accounted for approximately 56.3 million metric tons (MMt) of gross consumption-based carbon dioxide equivalent (CO_2e) emissions in 2005, an amount equal to 0.8 percent of total U.S. gross GHG emissions (NDEP 2008). From 1990 to 2005, Nevada's emissions grew from 34.1MMtCO_2e to 56.3MMtCO_2e, for an increase of 65 percent, as compared to 16.3 percent growth in U.S emissions during the same period.

Mining operations at the Genesis Project and in the Carlin Trend involve combustion of coal (for electrical power), diesel, propane, and gasoline, all of which contribute CO_2 to the atmosphere. Burning fossil fuel (natural gas and coal) for electrical generation and unleaded gasoline and diesel fuel account for 78 percent of statewide emissions of CO_2 (NDEP 2008). Mining in the Carlin Trend represents less than one percent of total CO_2 emissions from industrial sources within Nevada (BLM 2008a).



Potential Mercury Deposition
From Genesis Project
Genesis Project
Eureka County, Nevada
FIGURE 3-5

h:\14069 Newmont Genesis\5000 GIS\adobe\Air_Genesis_Projec_updated_102209t.ai

Carbon dioxide is not regulated under any state or federal laws or regulations and no air quality standard has been developed for this component of atmospheric gas. In response to a Supreme Court decision interpreting the Clean Air Act, the USEPA has announced it will publish an advance notice of proposed rulemaking addressing mechanisms for regulating GHG emissions.

Mercury Emissions

Mercury deposition data for the Carlin Trend and State of Nevada were compiled using data from the EPA REMSAD model. Results of REMSAD modeling are used to quantify contributions of specific sources and source categories of mercury deposition within the lower 48 states (EPA 2006). The REMSAD model computes site-specific output of mercury deposition in g/km^2/yr based on a variety of parameters.

The output is in digital grid format encompassing EPA Region 9 as a set of 144 km^2 cells (n = 347,606), each with a cell ID and total deposition value. The data are delivered in a geodatabase format specific to geospatial data and related tabular attributes. The geodatabase includes the total contribution for each cell from each source site within the Region (a total of 298 sources). REMSAD model results, including the global pool for Nevada is 11.1 g/km^2/yr.

Because output data from the model are a grid of square cells (not conducive to accurate distribution mapping), predictions were created using Kriging. Kriging is a geostatistical method of predicting values at unmeasured locations based on weights of values at measured locations (in this case, the center of each grid square). Deposition contours were created based on the kriged dataset. The kriged dataset was contoured to display the extent of measurable deposition from the specified sources, as determined by the EPA REMSAD model.

Figure 3-6 portrays cumulative deposition values for mercury from Newmont's Mill 6 Facility and Barrick's Betze/Post Mill. The deposition values are represented in isopleths with the highest value portrayed as 3.0 g/km^2/yr about 20 kilometers north of Barrick's Betze/Post Mine and decreasing in increments of 0.25 g/km^2/yr to the lowest predicted total deposition value of 0.10 g/km^2/yr about 120 kilometers north of the specified source.

The TS Power Plant operates under Class I Air Quality Operating Permit No. 4911-1349, issued by NDEP – Bureau of Air Pollution Control. The Plant emits approximately 0.02 lbs of mercury per gigawatt hour, on an annual basis. A 200 MW capacity for 8,760 hours/yr equates to 1,752 gigawatt hours emitting approximately 35 lbs of mercury annually. The TS Power Plant has installed activated carbon injection for mercury control, and recent performance tests showed compliance with that limit (AECOM Environment 2009).

Mercury emissions from roaster operations at Newmont's South Operations Area Mill 6 in 2008 totaled 422 lbs (NDEP 2009). Roaster operations at Barrick's Betze/Post mill facility emit approximately 166 lbs during 2008 (NDEP 2009). TS Power Plant emissions represent approximately three percent of the existing mercury emissions in the Carlin Trend.

With the exception of coal-fired power plants, no ambient air quality standard has been adopted for mercury by either the EPA or the State of Nevada. Emissions of mercury from processing ore generated

from the Genesis Project would not increase annual mercury emissions but would add to the overall lifetime mercury emissions and deposition in the CESA. The cumulative mercury in the environment, whether with or without mercury from the Genesis Project is not viewed as an issue of concern in the CESA. No mercury concentrations exceeding water quality standards have been detected in area streams monitored by mining operations in the Carlin Trend (BLM 2007a, 2007b, 2008a). Five surface water samples from Rodeo Creek are submitted annually for laboratory analysis as part of Newmont's Leeville Project Mitigation Plan. Analysis of samples collected in 2008 indicated mercury concentrations in Rodeo Creek were below reporting limits (<0.0002 milligram per liter [mg/l]) (Newmont 2009c).

3.4.1.4 POTENTIAL MITIGATION AND MONITORING MEASURES

No proposed mitigation or additional monitoring measures for air resources have been identified by BLM. No residual effects on air quality have been identified from implementation of the Proposed Action. Mercury emissions continue to be addressed under the Nevada Mercury Air Emission Control Program.

3.4.2 GEOLOGY and MINERALS

3.4.2.1 AFFECTED ENVIRONMENT

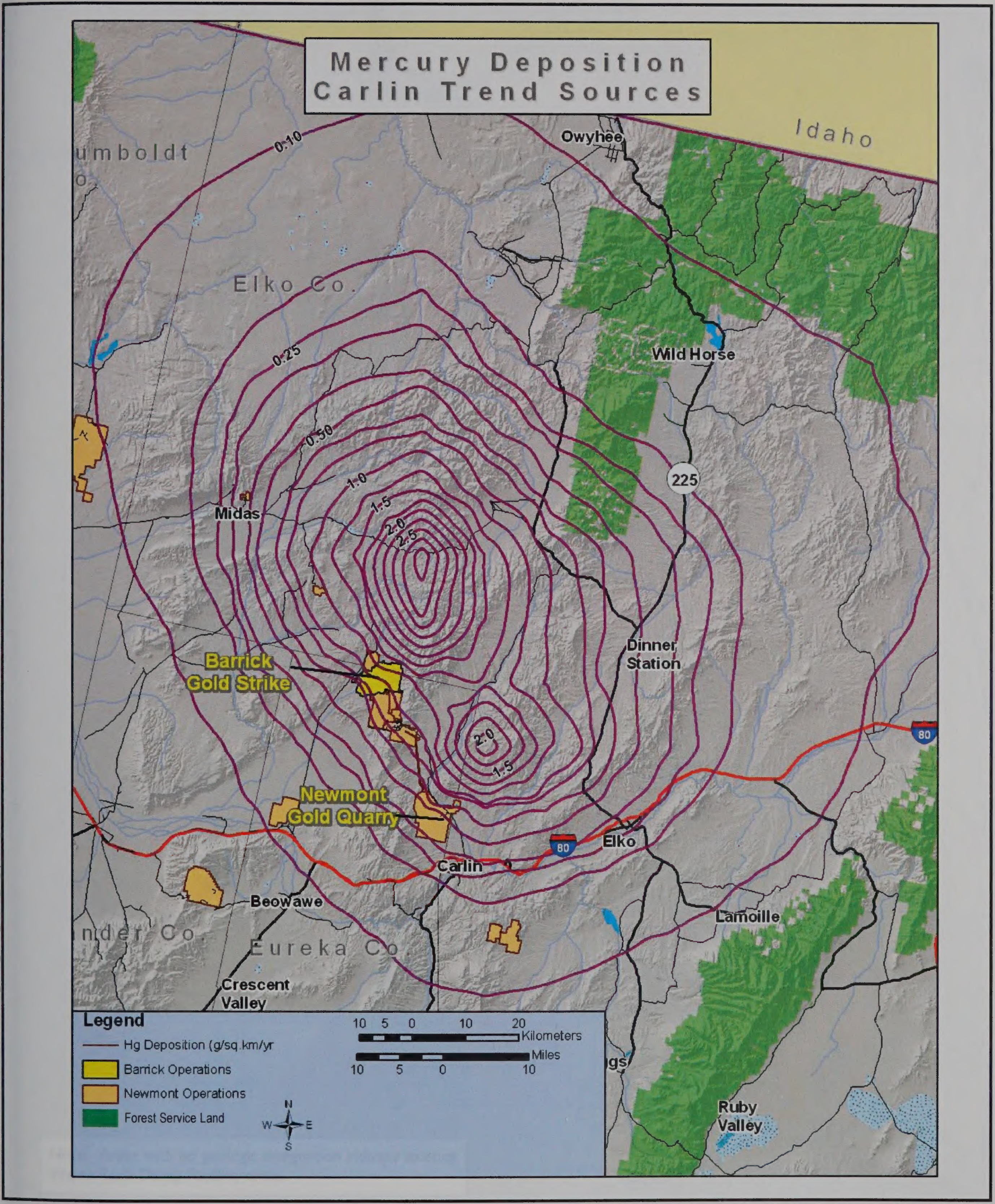
Geology

The Study Area for geology and minerals encompasses the Project area within the Genesis-Bluestar Operations Area. The proposed Genesis Project is located within the Basin and Range Province, a region that extends over most of Nevada and portions of adjoining states. Range-front faulting has created north-south trending fault-block mountain ranges separated by broad valley fill with unconsolidated sediment. The Carlin Trend is a north-northwest alignment of predominantly carbonate-hosted gold deposits. Regional folding and thrusting placed siliceous (upper plate) rocks over carbonate (lower plate) rocks. The primary thrust surface in the area is referred to as the Roberts Mountain Thrust. The Gen Fault bisects the Genesis Project area and separates the eastern carbonate assemblage from the western siliceous assemblage.

Lower plate rocks are exposed by a combination of folding and high-angle faulting. The Genesis deposit is located within the hinge zone of the Tuscarora anticline, while the Bluestar and Bobcat deposits occur in the west and the Beast/Sold deposits on the east limb of the same anticline. Numerous dikes and sills are emplaced along bedding planes, low-angle faults, and high-angle faults. The northern portion of the Genesis deposit was intruded by the Goldstrike diorite-granodiorite sill complex.

The western part of the Project area consists primarily of eastern assemblage carbonate rocks from the Roberts Mountains, Popovich, and Rodeo Creek formations. Siliceous rocks from the Vinini Formation comprise most of the eastern part of the Project area. **Figure 3-7** is a surface geology map of the general Project area. Sedimentary rocks in the Genesis Pit have been cut by the Gen Fault, with siliceous Vinini Formation on the east side of the fault, and carbonate Popovich and Roberts Mountains formations on the west side (**Figure 2-8**).

Dominant alteration associated with mineralization within the carbonates is decalcification with accompanying minor silicification, clay alteration, and quartz-sericite-pyrite alteration. Sulfide deposition accompanied these alteration events.



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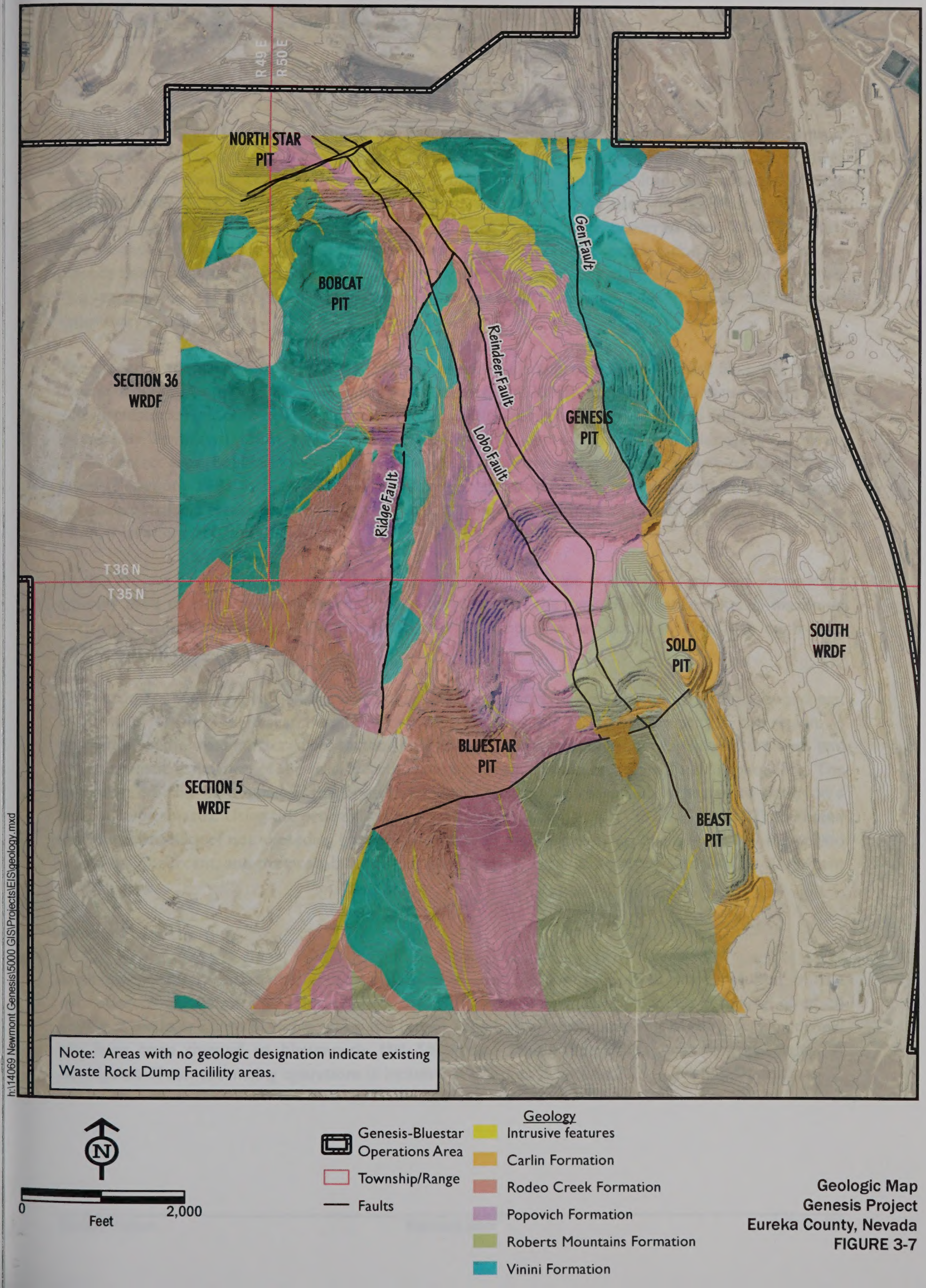
Barrick and Newmont REMSAD results ($g/km^2/yr$)

Mercury Deposition
Carlin Trend Sources
Genesis Project
Eureka County, Nevada
FIGURE 3-6



Geologic Map
Genesis Project
Eureka County, Nevada
FIGURE 3-7

Seismicity

The Genesis Project is located in the Great Basin seismic zone, a region characterized by moderately high rates of seismic activity (Algermissen *et al.* 1982). Historic earthquakes (post-1872) within 30 miles of the site have ranged from barely detectable to magnitude 5.1. Two magnitude 5.1 earthquakes have occurred: one on September 18, 1945, 25 miles south-southwest of the site, and the other on October 22, 1966, 23 miles south from the site. A magnitude 6.0 earthquake occurred near Wells, Nevada, approximately 80 miles northeast of Elko on February 21, 2008. The source location determined by the Nevada Seismological Laboratory was approximately six miles northeast of Wells at a depth of 4.2 miles. The earthquake has not been associated with a previously mapped fault (Nevada Seismological Laboratory 2008).

The closest evidence of historic (post-1872) surface faulting is approximately 69 miles from the Project area at the location of the Pleasant Valley earthquake (BLM 2002). The nearest surface-rupture faults with prehistoric Holocene-age displacement (active faulting between 12,000 years ago and year 1870), as mapped by Slemmons (1983), are located in Boulder Valley, approximately eight miles west-southwest of the Project area. Boulder Valley faults were estimated to have had displacement within the last 2,000 years (Slemmons 1983 in BLM 2002). The last major structural event was reactivation of the north-northwest-striking, steeply east-dipping Gen fault, a major normal fault zone with 800 to 1,200 feet of offset (Newmont 2007a).

During Project design, potential effect of earthquake shaking on mine facilities was assessed. Parameters typically used to characterize siesmicity are: 1) magnitude of the controlling earthquake; 2) maximum horizontal acceleration induced in bedrock; and 3) probability of occurrence of the controlling earthquake (BLM 2002).

The maximum predicted earthquake magnitude (M) for the area, as determined by several researchers, is shown in **Table 3-6**. Researchers used two separate methods to assess seismicity in the region: 1) estimation of the maximum credible earthquake based on determination of active faults in the area, and 2) probabilistic estimation of the risk of earthquake occurrence based on regional seismic modeling. The maximum credible earthquake is the largest earthquake that can be reasonably expected to occur on a fault or over an area. Using the probabilistic approach, Algermissen *et al.* (1982 in BLM 2002) estimated that the probability of not exceeding bedrock acceleration of 0.17 gravity (g) in any given 50-year period would be 90 percent, and the probability of not exceeding 0.35 g in 250 years would also be 90 percent (**Table 3-6**).

Mining Production

Existing operations associated with the Genesis-Bluestar Operations Area have resulted in the extraction of approximately 139Mt of ore and 413Mt of waste rock since inception of mining, of which 130Mt of oxide ore have been placed on the North Area Leach Facility, and 9Mt of refractory oxide/mill ore have been shipped to Newmont's Mill 5/6 in the South Operations Area for processing. A description of current mining operations is included in Chapter 2, Section 2.2.1 – Existing Operations.

TABLE 3-6 Seismic Characterization for the Genesis Project Area			
Assessment Method	**Maximum Earthquake Magnitude (M)**	**Maximum Horizontal Acceleration (g)**	**Probability of Occurrence**
Regional Probabilistic Assessment	7.3	0.17	90% probability of not being exceeded in 50 years
	7.3	0.35	90% probability of not being exceeded in 250 years

Note: gravity (g) = 9.81 meters per second
Source: Algermissen *et al.* 1982, 1990.

Rock Characterization

Various rock types present in the Genesis Project area have been analyzed for geochemical characteristics. **Appendix B** and **B-1** summarizes results of geochemical testing conducted to predict behavior of the rock when exposed to atmospheric oxygen and precipitation during mining and after closure and reclamation of the Project for the Proposed Action and No Action Alternative.

Based on geochemical test results, approximately six percent (28Mt) of waste rock that would be produced as a result of the proposed Genesis Project would be managed as potentially-acid generating (PAG) rock. The remaining waste rock (approximately 423Mt) would be managed as non-PAG. Section 2.3.5 – Waste Rock Management, provides a description of waste rock management for the Genesis Project.

3.4.2.2 DIRECT AND INDIRECT IMPACTS

Proposed Action

Continued mining at the Genesis Project would result in removal of approximately 60Mt of ore and 450Mt of waste rock over a twelve-year period. Approximately 48Mt of ore would be transported to the North Area Leach Facility and 12Mt transported to Newmont's South Operations Area for processing in Mill 5/6.

Waste rock associated with the proposed Genesis Project would be backfilled into mined-out pits or placed in waste rock disposal facilities (see Section 2.3.5.4 – Waste Rock Disposal Facilities). Depending on residual ore reserves in individual mine pits, backfilling pits would increase the future cost of mining/developing any ore resources that might remain beneath the pits, compared to leaving the pits open.

Geochemical testing shows that approximately six percent (28Mt) of waste rock to be generated during mining at the Genesis Project would be managed as PAG (NCV less than 0.0 or paste pH less than 6).

PAG waste rock would be managed by encapsulation in backfilled pits and existing external waste rock disposal facilities as described in Section 2.3.5.3 – PAG Encapsulation Cells. Potential trace metal release and resultant predicted geochemical effects on the environment from placement of waste rock in mined-out pits and in waste rock disposal facilities are discussed in Section 3.4.3 - Water Quantity and Quality.

No Action Alternative

Implementation of the No Action Alternative would result in completion of mining under current authorizations and closure plans. Pit backfill associated with the Proposed Action would not occur, resulting in approximately 450 acres of open pits, including a pit lake of about 41 acres in the Genesis Pit.

Because mine pits would remain open (not backfilled) under the current approved closure plan, access would be maintained. Current reserves and other mineralized rock currently classified as resources, which could potentially become reserves if the price of gold is high enough, could be mined in the future if the open pits were not backfilled.

3.4.2.3 CUMULATIVE EFFECTS

The geographic area used for analyzing potential cumulative effects associated with mining, exposure of rock to atmospheric conditions, and resultant release of trace metals to the environment includes the Carlin Trend (see Section 3.3.1 - Mining and Mineral Development). The rationale for selecting this CESA is based on the location and characteristics of rock materials that have been and would be mined, and the potential for creation of additive effects to water quality in the Carlin Trend.

Large-scale mining is projected to continue in the Carlin Trend with ongoing operations expanding individual mine areas to permitted limits. Ongoing and future mine development would result in expansion to and creation of open pits, underground mines, waste rock disposal areas, heap leach pads, milling and tailing storage facilities, and the construction and operation of ore processing facilities. BLM estimated that approximately 7,800 acres of existing and foreseeable mining disturbance would remain as open pits in the Carlin Trend.

Future exploration may also result in delineation of refractory ore zones that may require additional dewatering systems for economical recovery of ore. Total volume of ore, waste materials, and gold that could be economically excavated from the Carlin Trend in the future is not quantifiable as the price of gold and individual ore body characteristics dictate whether any particular ore body could be economically mined.

Topography of the area would continue to be modified as a result of mine excavation, waste rock and tailing disposal, reclamation, and other mine related surface disturbance. Expansion and operation of the Genesis Project would add incrementally to the alteration of topography and the removal of mineral resources and mine waste within the CESA.

Continued mining may afford the opportunity to backfill mined-out pits with waste rock from future operations. Such opportunities would be judged individually and based upon accessibility as well as influence on future mining activities. Backfilling and subsequent reclamation would restore land to pre-mining uses, but backfilling may preclude access to additional or lower grade mineral resources.

Movement of overburden or waste rock and ore rock materials as a result of mining results in relocation of rock from natural emplacement to manmade waste rock disposal sites, heap leach piles, or tailing storage facilities. Rock that contains sulfides can react with oxygen and water (precipitation) to form acid that can liberate trace metals from the rock; providing that sulfides and trace metals are in sufficient concentration and form to be released via this mechanism.

Carbonaceous waste rock that contains no or low concentrations of sulfide minerals and elevated concentrations of carbonate minerals provides neutralizing and/or buffering effects on acidic leachate that may form as a result of contact with sulfide bearing waste rock. The neutralization of acidic leachate can arrest the movement of trace metals in leachate through various chemical reactions including precipitation, co-precipitation, and adsorption.

Waste rock generated in the Carlin Trend is sampled, tested, and classified in accordance with NDEP Waste Rock and Overburden Evaluation Guidelines (NDEP 1996) to determine potential to generate acid. Waste rock is sampled and analyzed for heavy metals and acid-base accounting. PAG waste rock identified is segregated, encapsulated, and monitored.

Development of refractory (sulfide) ore deposits in the Carlin Trend has increased the amount of PAG material stored in stockpiles and deposited in waste rock disposal facilities. Analytical methods used to determine PAG rock also vary by mine operation and over time. Methods employed during the early stages of mine development in the Carlin Trend, such as static testing and whole rock analysis, have evolved to include a variety of kinetic testing methods currently used.

Waste rock disposal facilities and sulfide ore stockpiles are designed and constructed in a consistent manner to minimize potential for acid drainage by control of the acid generation process. In general, these procedures are based on the strategy that acid generation can best be prevented by minimizing the amount of water which contacts PAG rock. Both refractory ore stockpiles and sulfide waste rock encapsulation units are designed and constructed to limit the exposure of sulfidic material to atmospheric oxygen, groundwater, direct precipitation, snowmelt, and storm water run-on. Design and construction criteria are described in the report, Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan (Newmont 2003).

Acid rock drainage has been observed at the Hollister Project Area and the Rain Mine Waste Rock Disposal Facility. Some acid rock drainage has been observed at refractory ore stockpiles at Newmont's South Operations Area (Gold Quarry Mine). This ore stockpile drainage occurs seasonally and is not measured by Newmont, but is captured and used in ore processing. Refractory ore stockpiles may be a source of acid drainage over the life of the operation, but these stockpiles will be processed and the area reclaimed during project closure and, therefore, has a relatively short-term potential for producing acid drainage. To date, with the exception of groundwater at the Hollister Project, none of the surface water or groundwater monitoring stations indicate evidence of acid-rock drainage within the Carlin Trend (BLM 2007a, 2007b).

3.4.2.4 POTENTIAL MITIGATION AND MONITORING MEASURES

No proposed mitigation or additional monitoring measures beyond existing groundwater, surface water, and waste rock monitoring have been identified by BLM for geology and minerals. No residual effects resulting from implementation of the Proposed Action have been identified.

3.4.3 WATER QUANTITY AND QUALITY

3.4.3.1 AFFECTED ENVIRONMENT

The Study Area for water quantity and quality encompasses the Project area within the Genesis-Bluestar Operations Area (**Figure 3-4**). Hydrology of the area surrounding the Genesis Project area consists of limited surface water in small drainages that are part of the Boulder Creek basin. No natural surface water drainages are present within the Genesis Project boundary. Groundwater in the Project area moves through siliceous and carbonate rocks, with strong influences from faults that extend through the Project area (primarily the Gen Fault).

Large-scale mine dewatering has been occurring for several years in the Carlin Trend including the Gold Quarry, Betze/Post, and Leeville mines, resulting in a relatively constant rate of groundwater level lowering over time. Dewatering at Betze/Post, Gold Quarry, and Leeville began in 1990, 1992, and 2003, respectively. Based on current mine plans, these dewatering activities are expected to cease by year 2012 for Gold Quarry, 2015 for Betze/Post, and 2018 for Leeville.

Additional water resources information for the general Project area is included in the Leeville Project Environmental Impact Statement (BLM 2002); Cumulative Impact Analysis of Dewatering and Water Management Operations for the Betze Project, South Operations Area Project Amendment, and Leeville Project (BLM 2000); and Boulder Valley Monitoring Plan (Barrick 2007b).

Surface Water

The Genesis Project is located on the west side of the Tuscarora Mountains within the Boulder Flat hydrographic basin (No. 61) (**Figure 3-8**). Boulder Creek, the main drainage in this basin, drains southwest but infiltrates or evaporates, before reaching the Humboldt River (**Figure 3-8**). Tributary drainages to Boulder Creek near the Genesis Project site include Bell, Brush, Rodeo, and Sheep creeks.

Most drainage channels in the vicinity of the Genesis site are intermittent or ephemeral (i.e., flow does not occur year-round through the entire stream reach). Some reaches of these streams have perennial or year-round flow in the upper headwater mountainous areas. Flow in other stream segments occurs primarily in response to rain events or snow-melt runoff. The U.S. Geological Survey (USGS 2008) operates gauging station no. 10324700 on Boulder Creek approximately one mile downstream of the Rodeo Creek confluence (**Figure 3-8**). Mean monthly flow at this Boulder Creek station for January, February, March, April, May, and June for the period 1991 to 2007 is 4.8, 6.5, 13, 20, 21, and 1.4 cubic feet per second (ft^3/sec), respectively (USGS 2008).

Other monitoring stations are located in the general area and are operated by Barrick and Newmont. These stations include Bell Creek, Brush Creek, Rodeo Creek, and upper Boulder Creek. Data from these stations and the Boulder Creek station described above would not directly reflect water quantity

or quality effects from the Genesis Project. Flow in these drainages is variable, ranging from no flow to short-term high flow resulting from storm events. When flow occurs in the tributary channels from rain events or snow melt, water normally infiltrates in alluvium prior to reaching Boulder Creek.

Surface water runoff from undisturbed areas in the Genesis Project site resulting from snowmelt or major rain events discharges to one of these tributary drainages. Most of the Genesis Project site is disturbed, with runoff from new disturbance areas captured in diversion ditches, berms, and water/sediment retention ponds. Sediment ponds and ditches are designed to contain a 100-year/24-hour precipitation event.

No natural ponds or lakes are located in the vicinity of the Genesis Project. A man-made, Two Million Gallon Pond is located east of the Genesis Pit (**Figure 2-2**) is used to store mine dewatering water. The TS Ranch Reservoir (**Figure 3-8**) is located 3.5 miles west of the Genesis Project area; this reservoir receives mine discharge water from several dewatering systems in the North Operations Area. The majority of water that collects in the Reservoir infiltrates to the underlying bedrock through a fault/fracture system.

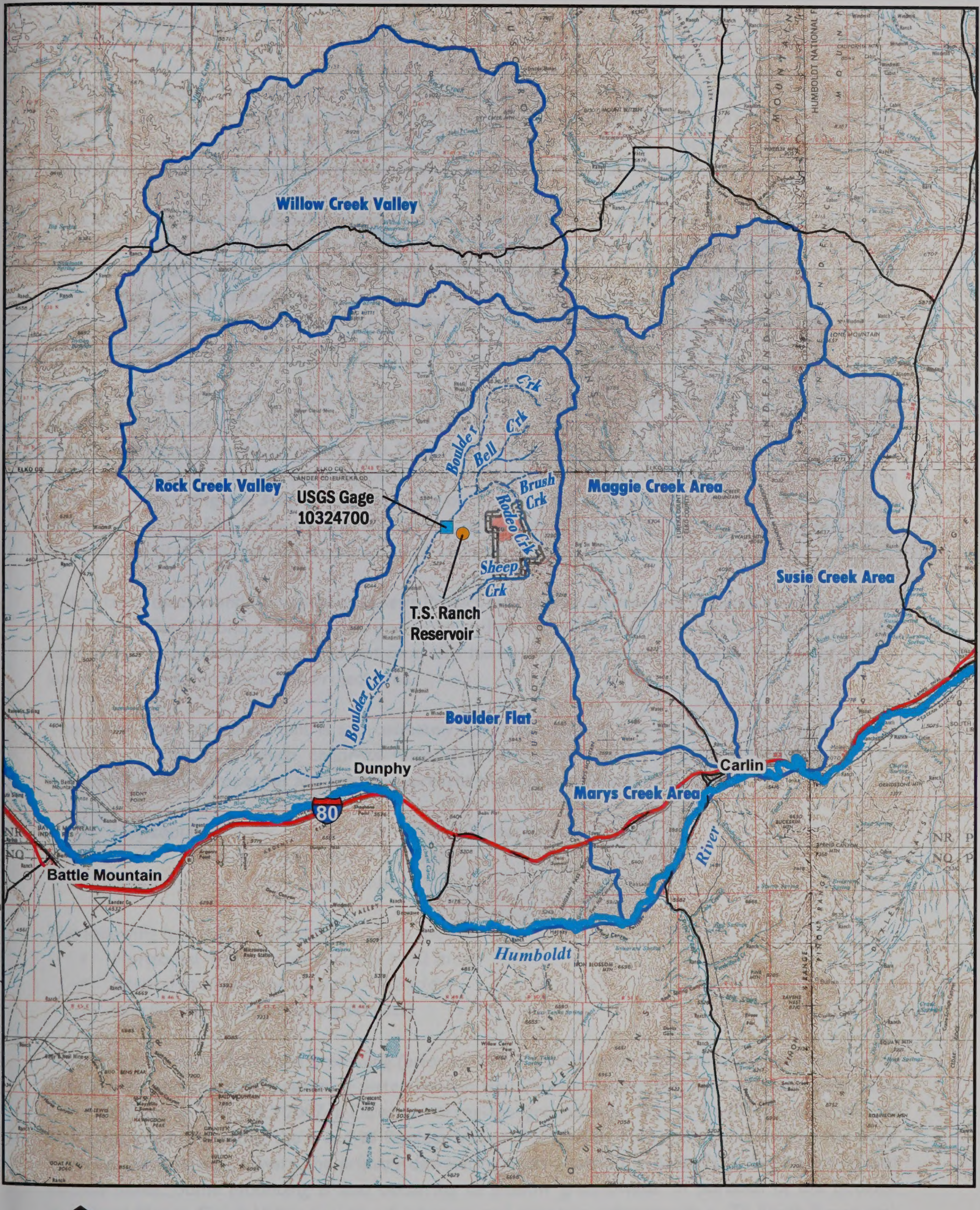
Numerous springs and seeps have been identified in the Carlin Trend, primarily on the flanks of the Tuscarora Mountains. On the west side of this mountain range, springs typically form in the headwaters of Rodeo, Brush, Bell, and Boulder creeks. Many of these mountain area springs are located above an elevation of 6000 feet amsl and have been categorized as perched water sources that are not connected to the regional groundwater flow systems. Most of the springs are small and typically flow at rates of five gpm or less. No springs have been identified in the Genesis Project area (BLM 2000).

Quality of surface water in the Project area is generally characterized as a calcium-bicarbonate type, with pH in the range of 7.5 to 8.5 (BLM 2002). Iron concentrations are elevated in some surface water samples collected in the Boulder Creek basin, and arsenic is elevated in some samples from upper Rodeo Creek (Barrick 2007b). Five surface water samples from Rodeo Creek are submitted annually for laboratory analysis as part of Newmont's Leeville Project Mitigation Plan. Analysis of samples collected in 2008 indicated mercury concentrations in Rodeo Creek were below reporting limits (<0.0002 mg/l) (Newmont 2009c).

Groundwater

Groundwater generally flows from areas of higher elevations (e.g., Tuscarora Mountains) toward the center of the basins (e.g., Boulder Basin). Most recharge to groundwater is derived from infiltration of precipitation and most discharge occurs through evapotranspiration. Potential annual evapotranspiration (50 in/yr) greatly exceeds precipitation (11.5 in/yr) (HCI 2007a). Other forms of discharge include pumping from wells, flow from springs/seeps, and underflow to rivers or to other basins.

Mining activities in the Carlin Trend have altered movement of groundwater due to dewatering activities including large-scale groundwater pumping, reinfiltration of mine water, and severing of hydrostratigraphic units as a consequence of open pit and underground mining. The collective mine dewatering operations, water management activities, and groundwater inflow to pit lakes during the post-closure period will continue to change the general water balance in the northern Carlin Trend area. A numerical groundwater flow model was initially developed in 1990 by HCI to predict potential



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0 Miles 10

Humboldt River
Intermittent Stream
Interstate Highway
Other Roads
Hydrographic Sub-basins (Same as Air-Basins)
Genesis-Bluestar Operations Area
Genesis Project

Surface Water Drainages
Genesis Project
Eureka County, Nevada
FIGURE 3-8

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hydrologic effects of mine dewatering in the Carlin Trend. The most recent version of the Carlin Trend model (HCI 2007b) was used to simulate historical dewatering along the Carlin Trend, predict future dewatering requirements for the Gold Quarry and Leeville mines, and assess impacts that future dewatering and water level recovery could have on water resources in the model area.

Most of the Genesis Mine (existing and proposed expansion) is located in carbonate rocks (lower plate), especially along the west side of the Project area (**Figure 3-7**). Siliceous rocks of the Vinini Formation (upper plate siltstone) and some intrusive rocks bound the Genesis Mine to the east and north. In some areas, siltstone and carbonaceous rocks are confined by overlying basin-fill deposits of the Carlin Formation. Surface geology is shown on **Figure 3-7**, and a typical hydrogeologic cross-section through the Genesis Pit is shown on **Figure 3-9**.

Several major faults extend north-south through the Genesis Project area (**Figure 3-7**), including the Gen Fault which extends through the Genesis Pit area. This fault is a barrier to groundwater movement. Regional dewatering associated with the Betze/Post and Leeville mines has lowered groundwater to levels well below the current and projected Genesis Pit bottom on the west side of the Gen Fault in the carbonate rocks (**Figure 3-9**). On the east side of the Gen Fault, the groundwater level in the siltstone remains about 400 feet above the current Genesis pit bottom (**Figure 3-9**). Current seepage rates from the east side of the pit highwall are about 50 to 100 gpm (HCI 2007a).

Other faults that extend through the Genesis Project area appear to have less influence on groundwater movement. The carbonates have higher permeability than the siliceous rocks. Shallow alluvial deposits of sand and gravel located in drainage bottoms also have relatively high permeability, but are of limited lateral and vertical extent in the Project area.

The lower plate carbonate unit is approximately 3,000 feet thick in the Carlin Trend area and is the hydrostratigraphic unit which connects regional groundwater among all of the major mines. The following hydraulic properties are used to represent the carbonate rocks (HCI 2007a):

- Horizontal hydraulic conductivity = 50 to 100 feet per day (ft/day)
- Vertical hydraulic conductivity = 0.5 ft/day
- Specific yield = 0.005 (dimensionless)

The following hydraulic properties represent the siliceous rocks (Geomega 2008a):

- Horizontal hydraulic conductivity = 0.2 ft/day
- Vertical hydraulic conductivity = 0.5 ft/day
- Specific yield = 0.065 (dimensionless)

Limited data exist to define the premining (prior to 1991) groundwater elevation throughout the Carlin Trend area. The reported premining water level in the Genesis Project area was approximately 5265 feet amsl (**Figure 3-9**) (HCI 2007c). Direction of regional groundwater flow in the Project area prior to 1991 was southwest along the trend of Boulder Valley (BLM 2000). Currently, groundwater has been lowered and is flowing toward the primary dewatering areas around the Betze/Post, Gold Quarry, and Leeville mines. Some mounding is also occurring to shallow groundwater in portions of the Boulder Valley and Maggie Creek Valley in areas of reservoir and irrigation infiltration (e.g., TS Ranch Reservoir) (BLM 2000).

In general, groundwater levels in the lower plate carbonate rocks currently are at an elevation of about 4175 feet amsl. Continued mining and dewatering plans for the Leeville and Betze/Post mines are projected to lower groundwater levels an additional 325 feet by the end of year 2018 to about 3850 feet amsl (HCI 2007c) (**Figure 3-9**). Groundwater levels in the upper plate siltstone east of the Gen Fault are at an average elevation of about 5400 feet amsl (**Figure 3-9**). As described in Section 2.3.4 – Mine Pit Dewatering, groundwater in the east highwall area will be dewatered during expansion of the Genesis Pit using a combination of drain boreholes and pumping wells (**Figure 3-9**).

Existing groundwater in carbonate rocks at the Genesis Project site is classified as calcium/magnesium/sodium-bicarbonate type water, with moderate alkalinity (135 mg/l), pH of 8, Total Dissolved Solids (TDS) of 258 mg/l, and sulfate of 47 mg/l. These water quality characteristics are from samples collected at well GEN-39 located in the Genesis Pit and screened in carbonate rocks (Geomega 2008a). Arsenic concentration from well GEN-39 is 0.4 mg/l which exceeds the federal drinking water standard of 0.01 mg/l. Mercury was not detected (<0.0002 mg/l), and thallium and antimony concentrations were 0.003 mg/l and 0.009 mg/l, respectively, which also exceed federal drinking water standards (0.002 and 0.006 mg/l, respectively) (Geomega 2008a).

Other monitoring wells in the North and South Operations Areas are used routinely to collect water level and water quality data. All water resources in the area are monitored as part of Newmont's Maggie Creek Basin Monitoring Plan, Barrick's Boulder Valley Monitoring Plan, and as part of Newmont's Leeville Project Mitigation Plan.

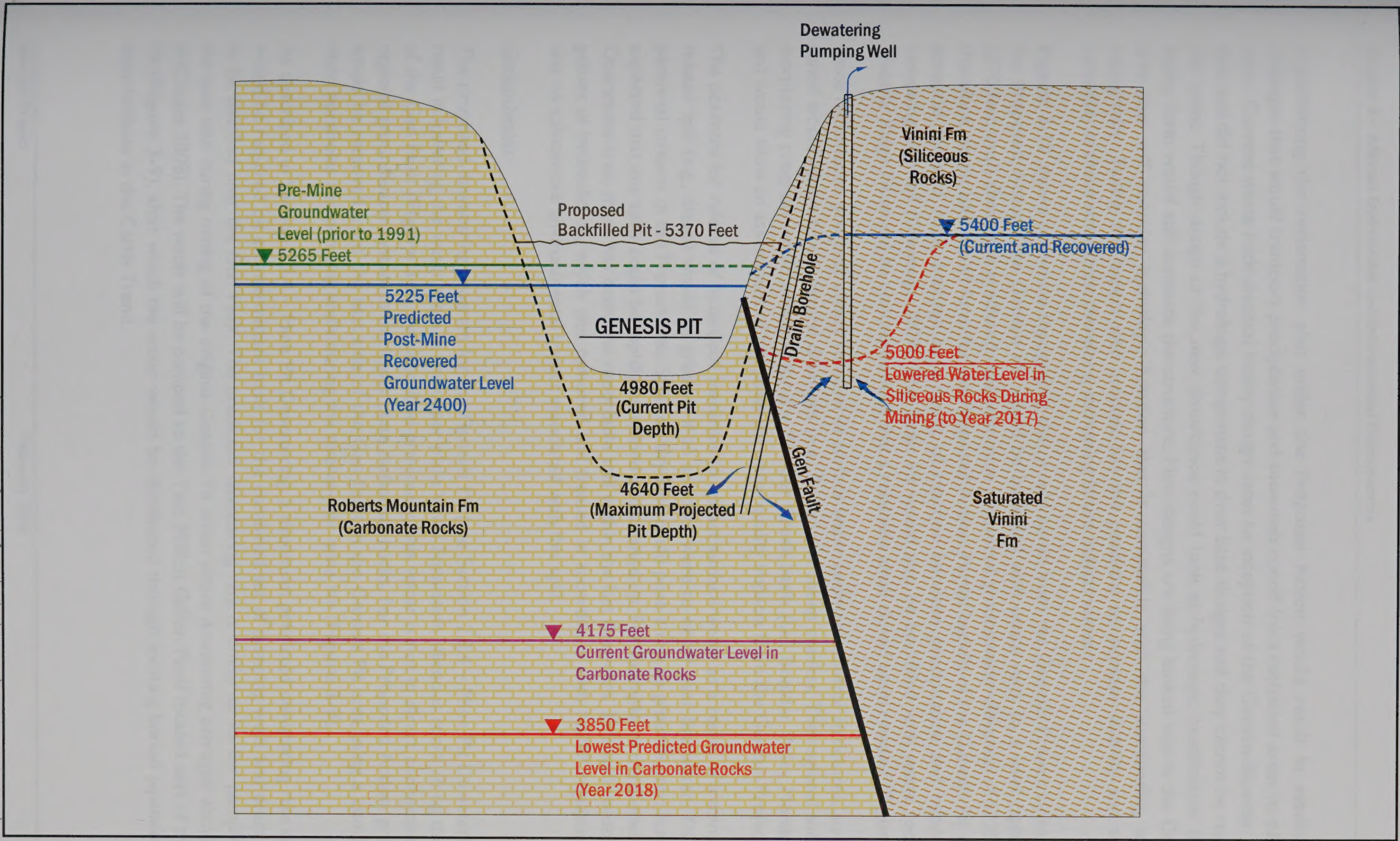
According to the Cumulative Impact Analysis (BLM 2000), the following groundwater rights are present in the Boulder Valley for general water use categories: 39 irrigation, 10 mining/milling, 21 stock water, and 2 other water rights. Only two of these groundwater rights, however, are located in the Genesis Project area (BLM 2000).

3.4.3.2 DIRECT AND INDIRECT IMPACTS

Proposed Action

<u>Surface Water</u>

No natural undisturbed drainages currently exist within the footprint of the Proposed Action. The entire area consists of mine pits, waste rock disposal facilities, growth media stockpiles, haul roads, and ancillary facilities (**Figure 2-2**). Runoff from precipitation in the Project area is collected in ditches and diverted to sediment ponds, with some runoff collecting in the existing mine pits. Ditches upgradient from disturbed areas are used to divert runoff from undisturbed areas around the mine site. Sediment control structures would remain active during the post-closure period until reclamation is in a stable condition. All of these surface water conditions would occur for the Proposed Action, with some modification to topography as a result of mining and reclamation activities (e.g., expanding Genesis Pit; developing Bluestar Ridge Pit; constructing new and expanded waste rock disposal facilities; and backfilling mine pits).



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Not To Scale

Projected Lowering of Water Table
Adjacent to Gen Fault
Genesis Project
Eureka County, Nevada
FIGURE 3-9

Implementing the reclamation plan under the Proposed Action would result in establishment of drainages that would transport precipitation and snowmelt runoff from reclaimed areas to adjacent land areas. Current waste rock disposal facility design dates to inception of the Genesis-Bluestar operations area and did not include a hydrologic component in their base designs and they cannot be redesigned at this point. Though design of the new disturbance could look at hydrologic modification the existing facility form would still dominate the structure. New designs are being looked into in the Carlin Trend area that will consider hydrologic function that is compatible with the surrounding undisturbed topography. Taking this aspect into account has the potential to increase stability and topographic variability of these structures; therefore, increasing future habitat values.

Figure 2-10 shows post-mine topography that would result from the Genesis Project closure plan for the Proposed Action. The Genesis Pit would be backfilled with waste rock to a level (approximately 5370 feet amsl) above the predicted final post-mine recovered groundwater elevation of 5225 feet amsl; therefore, no pit lake would form for the Proposed Action. Partial backfill of the Genesis Pit would limit potential for acid rock drainage as a result of reaction between precipitation and minerals in the remaining highwall (Geomega 2009). The Beast Pit would also be backfilled with waste rock, and the Bluestar Ridge Pit would be contoured such that a relatively small closed basin remains (**Figure 2-10**).

Once reclamation progress allows removal of surface water sediment control structures, surface water runoff would return to the natural drainages (e.g., Rodeo and Sheep creeks). The regional surface water monitoring program would continue for the Boulder Creek basin (i.e., Boulder Valley Monitoring Plan) and would allow an assessment of any potential water quality impacts from the Genesis Project site.

The potential for release of hazardous materials to impact surface water as a result of a transportation-related spill (e.g., diesel) would be greatest if an accident were to occur near live water. There are no perennial streams in the Project area. Spills on dry land could pose a risk to groundwater; however, it is expected that any spills could be rapidly contained and cleaned up. For example, in the Genesis-Bluestar Operations area, there has been one reportable spill within the last five years. This spill consisted of 154 gallons of hydraulic oil, which was removed and treated in accordance with NDEP regulations. There was no substantive environmental impact associated with this spill.

Groundwater

The proposed dewatering program for the Genesis Pit (see Section 2.3.4 – Mine Pit Dewatering) would result in lowering the water table in the upper plate Vinini Formation siliceous rocks along the east side of the Gen Fault (**Figure 3-9**). As described previously, this water is not in direct connection with the regional groundwater system in the lower plate carbonate rocks. For the Proposed Action, groundwater would be removed from the east side of the Gen Fault in the Genesis Pit area using a combination of drain boreholes and pumping wells during the twelve-year mine life (**Figure 3-9**).

As described in Section 2.3.4 – Mine Pit Dewatering, a maximum predicted dewatering rate of 250 gpm would be required on an intermittent basis for the combined set of pumping wells and drain boreholes to be installed near the Gen Fault. The predicted dewatering rate is similar to earlier pumping rates in the east wall during mining of the original Genesis Pit when active dewatering averaged about 220 gpm (HCItasca 2008). The water will be pumped to the Two Million Gallon Pond located east of the Genesis Pit (**Figure 3-9**), after which the water would be distributed through existing buried pipelines to other mine facilities in the Carlin Trend.

The drain boreholes would allow groundwater in the siliceous rocks (Vinini Formation) east of the Gen Fault to flow into the underlying carbonate rocks below the projected depth of the Genesis Pit on the west side of the Gen Fault (**Figure 3-9**). This relatively minor short-term transfer of groundwater from one lithologic unit to another is expected to have no adverse impact to groundwater quantity or quality. The quality of water between the two units is similar, and the quantity of water draining to the carbonates would likely be a small percentage of the total expected dewatering rate of about 250 gpm.

During the twelve-year life-of-mine, the water table in the Vinini Formation near the east side of the Gen Fault would be lowered approximately 400 feet, from a current elevation of about 5400 feet amsl to 5000 feet amsl to keep the east wall dry during mining (**Figure 3-9**). Groundwater in siliceous rocks east of the Gen Fault is poorly connected to the groundwater system in the carbonate rocks west of the fault because of the major difference in permeability.

Groundwater in the siliceous rocks east of the Gen Fault would begin to recover slowly after the twelve-year Genesis mine life. The Carlin Trend model does not include the complexity of the localized Genesis east wall faults and compartments, but data show that the area of groundwater drawdown east of the Gen Fault for current and proposed mining covers a relatively small area with steep gradients (HCItasca 2009). Groundwater level recovery of 90 percent or more in the east Genesis pit wall is expected to take over 100 years (HCItasca 2009).

The Genesis east wall lies between the Gen Fault and Post Fault. Drawdown from Genesis east wall dewatering is not predicted to propagate east of the Post Fault under Rodeo Creek or north of the intrusives (**Figure 3-10**). Drawdown from the east wall dewatering and over 100 years of recovery is predicted to be localized with immeasurable impact on Rodeo Creek or other surface water because:

a) the reach of Rodeo Creek near Genesis is ephemeral and only flows during spring run-off; and,
b) groundwater is below the creek bed and is not connected to any seeps, springs, or streams in the Project area.

The Carlin Trend groundwater flow model was used to predict drawdown that could occur due to all mine dewatering in the Carlin Trend. The updated model (HCItasca 2008) assumed that pumping in the east wall of the Genesis Pit would cease in 2017. Dewatering at the Betze/Post and Leeville mines were simulated to cease at the end in 2015 and 2018, respectively. Results of the updated model (HCItasca 2008) show that the additional groundwater pumping and dewatering of the Genesis east wall would cause no measureable change to the ten-foot drawdown isopleths from the earlier prediction (HCI 2007a). Therefore, the Proposed Action would have no additional adverse effect on regional groundwater drawdown occurring in the Carlin Trend.

After 2017-2018, groundwater levels in siliceous rocks and carbonate rocks in the Genesis Project area would begin to rise and approach pre-mine elevations (**Figure 3-9**). Under the Proposed Action, partial backfilling of the Genesis Pit would eliminate formation of a pit lake (**Figure 3-9**). During recovery of the regional groundwater level in the carbonate rocks, groundwater would eventually reach the base of the Genesis Pit and contact waste rock (in-pit backfill). The ultimate base of the Bluestar Ridge Pit (5340 feet amsl) would be above the final recovered groundwater level in the Project area (5225 feet amsl).

After recovery of water levels in the northern Carlin Trend is complete, groundwater in the Genesis area is predicted to flow northward toward the Betze/Post pit lake (HCI 2007b). Complete recovery of groundwater levels in the Genesis Project area would be reached in about 2400 (HCI 2007b).

Under the Proposed Action, geochemical modeling to predict the quality of water in the backfilled Genesis Pit and in the waste rock disposal facilities shows the rock would not generate acid drainage. PAG waste rock would be placed in encapsulation cells located above the pre-dewatering groundwater level in the waste rock disposal facilities (**Figure 2-9**). As the water table rebounds in the backfilled Genesis Pit, trace metals and other constituents released during eventual saturation would decrease to background groundwater quality conditions (Geomega 2008a). Attenuation of some constituents in the carbonate rocks would reduce concentrations in groundwater in the vicinity of backfilled pits and waste rock disposal facilities. See **Appendix B** and **B-1** for a summary of geochemical modeling results for the Genesis Project.

Post-reclamation contours associated with the Proposed Action (**Figure 2-10**) would eliminate low points (i.e., open pits) that would result from the current reclamation closure plan for the Project area. With the exception of the Genesis and Bluestar Ridge pits, runoff from precipitation events would not collect in pit bottoms and be subject to infiltration and evaporation. Final reclamation of the Project area would result in a water balance (i.e., movement of surface water and groundwater) that is similar to pre-disturbance site conditions.

Ongoing lowering of the water table in the carbonate rocks west of the Gen Fault will continue until mine dewatering ceases at the other nearby mine sites (i.e., 2015 for Betze/Post, and 2018 for Leeville). Maximum lowered water table elevation in the carbonate rocks at the Genesis Project site is approximately 3850 feet amsl (compared to current elevation of about 4175 feet amsl (**Figure 3-9**). As shown on **Figure 3-9**, the Genesis Pit during mining would not influence or be influenced by this regional lowering of groundwater in the carbonate rocks.

No Action Alternative

<u>Surface Water</u>

Effects to surface water resources for implementation of the No Action Alternative would be similar to the Proposed Action described above, except that the existing mine pits would not be backfilled, and the Bluestar Ridge Pit would not be constructed. Reclamation of the Project site would result in establishment of drainages that would transport runoff from reclaimed areas to adjacent drainages. Existing authorizations do not provide for a natural hydrologic design on the Waste Rock Disposal Facilities and may result in substantial erosion and suboptimal habitat replacement. **Figure 2-6** identifies post-mine topography that would result from the Genesis closure plan for the No Action Alternative. Under the No Action Alternative, the Genesis, Beast, and Bluestar mine pits (total of approximately 450 acres) would remain as closed basins. Some surface water runoff from precipitation on the affected areas would flow into these pits and be subject to infiltration and evapotranspiration.

A pit lake having a final surface area of about 41 acres would form in the Genesis Pit as a result of the recovered water table in carbonate rocks. After regional mine dewatering ceases, gradual rebound of the regional water table would require several hundred years. The final predicted Genesis pit lake elevation of 5225 feet amsl (**Figure 3-9**) is estimated to occur about 400 years after cessation of dewatering activities (Geomega 2008b; HCI 2007b). This lake would have no outlet to surface water, but would be subject to water loss through evaporation. Elevated levels of some metals (e.g., aluminum, antimony, arsenic, beryllium, nickel, selenium, and thallium) predicted for final pit lake water quality would exceed drinking water quality standards (Geomega 2008b). See **Appendix B** and **B-1** for a summary of geochemical modeling results for the Genesis Project.

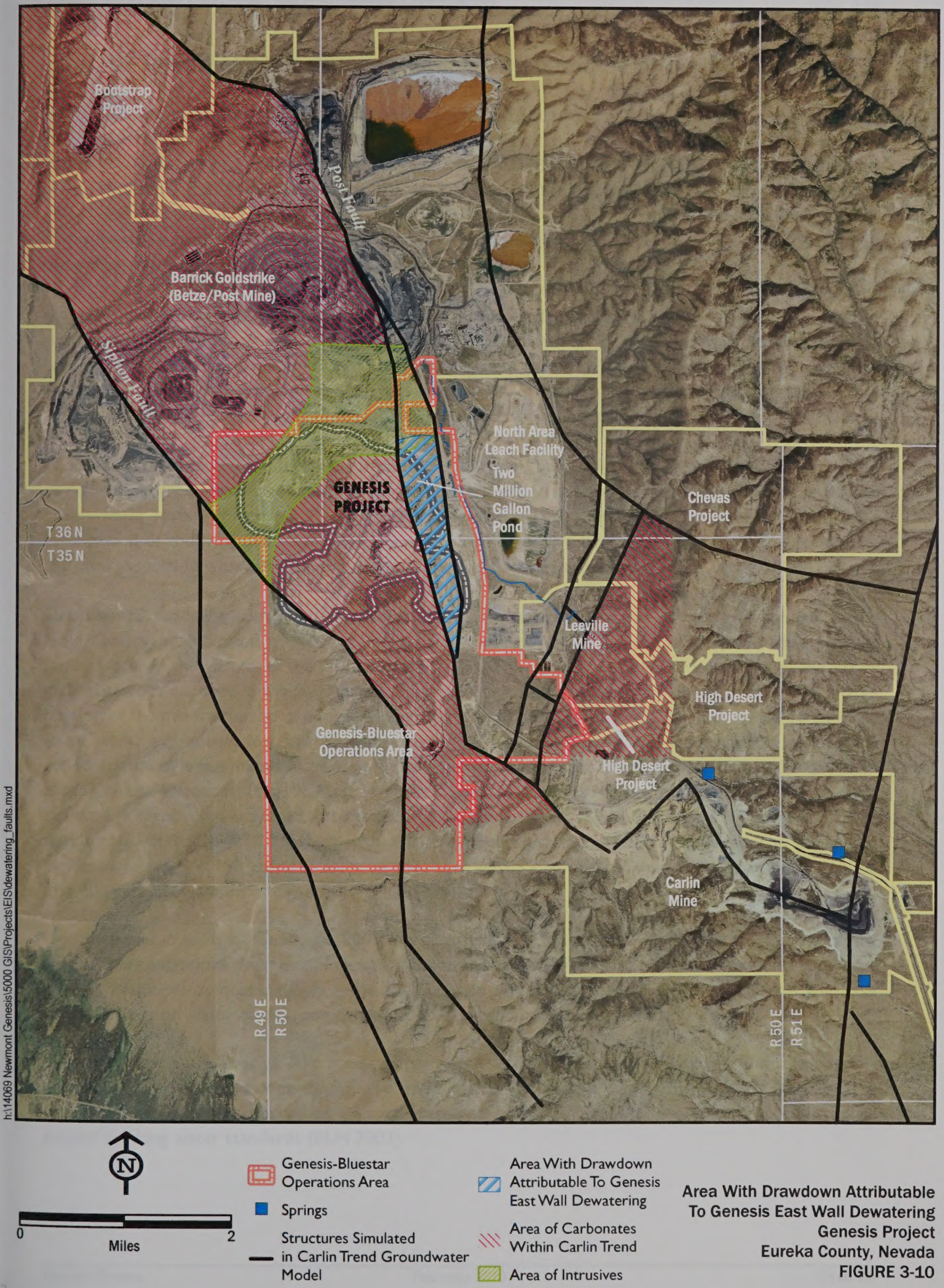
Groundwater

Potential impacts to groundwater quality would be similar to those described above for the Proposed Action with respect to potential for generating acid and releasing metals to groundwater. No additional waste rock, however, would be generated and placed either as pit backfill or in the waste rock disposal facilities, other than from currently approved mine activities.

The Genesis Pit lake is not expected to begin forming from the rebounding regional water table until about 2130. Once groundwater levels are near equilibrium at elevation 5225 feet amsl, the regional groundwater flow system is predicted to move from the Genesis area north toward the Betze/Post Mine area. The amount of groundwater flow from the Genesis Pit to the regional groundwater flow system is predicted to be low (one to two gpm) (HCI 2007b). Model predictions show that most of the pit lake development will be completed by 2400 (HCI 2007a). Evaporation from the pit lake surface will be a long-term removal of water from the groundwater system.

Groundwater flowing into the Genesis Pit would come primarily from the carbonate rocks as the water table rises when regional mine dewatering ceases. Well GEN-39 was selected to represent background groundwater quality as it is completed in carbonate rocks in the Genesis Pit. Ambient groundwater samples collected from this well show that antimony, arsenic, and thallium exceed drinking water standards (**Appendix B** and **B-1**). It is believed that these concentrations are representative of pre-mining water quality.

As the pit lake surface rises, evapo-concentration will result in increasing concentrations of some constituents over the long-term. Precipitation of some solutes will occur with resulting decreasing concentrations. Overall, the pit lake is predicted to be alkaline (approximate pH of 8.6), with some metal concentrations (i.e., aluminum, arsenic, antimony, beryllium, nickel, selenium, and thallium) above drinking water standards (Geomega 2008b) (**Appendix B** and **B-1**). After full recovery of the water level in the Genesis Pit, model results show that some pit lake water would mix with the regional carbonate groundwater flow system which will move north toward the Betze/Post Mine where another pit lake also will form (HCI 2007b). As stated above however, the amount of groundwater flow from the Genesis Pit is predicted to be low (HCI 2007b). See **Appendix B** and **B-1** for a summary of geochemical model results for the Genesis Project.



Area With Drawdown Attributable To Genesis East Wall Dewatering
Genesis Project
Eureka County, Nevada
FIGURE 3-10

3.4.3.3 CUMULATIVE EFFECTS

The CESA for water quantity and quality encompasses surface water and groundwater in the vicinity of the Carlin Trend (**Figure 3-8**), including hydrographic basins that contain mine development areas and receive mine discharges, and areas where groundwater drawdown has occurred and will expand due to mine dewatering. The basins included in the Study Area are: Susie Creek (No. 50); Maggie Creek (No. 51); Marys Creek (No. 52); Boulder Flat (No. 61); Rock Creek (No. 62); and Willow Creek (No. 63). All of these basins are tributaries to the Humboldt River, beginning up-river from the town Carlin, and extending down-river to the town of Battle Mountain (**Figure 3-8**).

Ongoing mining activity associated with previously permitted operations in the CESA has resulted in transformation of surface water drainages into control features to divert surface flow from mine components. The proposed Genesis Project would extend the duration of this activity for an additional twelve years, at which time reclamation and restoration of mining related surface disturbance would help re-establish drainage patterns and features that better resemble pre-mining conditions.

Proposed groundwater dewatering (approximately 250 gpm) associated with the Genesis Project would occur in local groundwater zones in low permeability siltstone not connected to the regional carbonate groundwater system (**Figure 3-9**). Intermittent dewatering in the siltstone just east of the Genesis Pit for a period of about twelve years would have little or no additive effect to ongoing regional dewatering activities associated with other operations (Leeville and Betze/Post operations) (HCItasca 2008).

Geochemical modeling conducted to predict the quality of water that would ultimately remain in the Gold Quarry pit indicated that the water quality would be similar or of higher quality than existing groundwater in the vicinity of the pit (Geomega 2001). The quality of the water would be influenced by carbonate rock exposed in the pit that would buffer development of acidic conditions; removal of a large portion of the mineralized zone due to mining would reduce the amount sulfides that would be exposed in pit walls; and adsorption and deposition of trace metals on ferric hydroxides would reduce the concentration of trace metals in pit lake water. Pit lake water is predicted to be alkaline with cadmium and selenium exceeding the 96-hour average aquatic life standard but not exceeding the 1-hour standard. Molybdenum is predicted to exceed both standards. The Gold Quarry pit is expected to have an ultimate pit depth of 1,370 feet with a lake surface elevation of 5091 feet amsl. The pit lake is expected to require 150 years to form to this level with 95 percent of this recovery occurring in the first 60 years of cessation of dewatering (HCI 1999).

Geochemical modeling by Geomega (2007) predicts that the Tara pit lake would have a near-neutral pH, arsenic concentrations less than influent groundwater, and antimony concentrations less than the Nevada municipal domestic supply standard. The lake will not form until around 2136 and will have consistently good water quality, comparable to existing groundwater in the Carlin Trend.

A study of the Betze/Post pit lake predicts that water would have a near-neutral pH, with the possible exception of acidic conditions during the early period of pit lake filling (BLM 2003). Also for the Betze/Post pit lake, concentrations of total dissolved solids, sulfate, and antimony are predicted to exceed drinking water standards (BLM 2003).

3.4.3.4 POTENTIAL MITIGATION AND MONITORING MEASURES

No proposed mitigation or additional monitoring measures beyond the current groundwater, surface water, and waste rock monitoring programs have been identified by BLM for water quantity and quality. No residual effects on water resources resulting from implementation of the Proposed Action have been identified. Monitoring being conducted by Newmont and Barrick under programs developed by NDEP would continue with implementation of the Proposed Action (i.e., Maggie Creek Basin and Boulder Valley Monitoring Plans).

3.4.4 SOIL RESOURCES

3.4.4.1 AFFECTED ENVIRONMENT

The Study Area for soil resources is the Genesis Project area. The proposed Genesis Project is located on landforms typical of the Basin and Range Province, with isolated, north-south trending, tilted, fault-blocked mountain ranges rising abruptly above large alluvium-filled desert basins. The mountain ranges, modified by recurring erosional and depositional cycles, consist of exposed sedimentary, metamorphic, and volcanic rock. Soil has formed on landforms dominated by gently to steeply sloping mountains and uplands, fans, piedmont fans, alluvial fans and terraces, alluvial plains, and remnant land surfaces.

The deepest and most developed soil types occur on alluvial valley bottoms and convex upland slopes. The youngest and often shallowest soil types are formed in recently deposited materials or in parent material recently exposed by erosion (USDA 1980).

The proposed Genesis Project is located on 1,488 acres disturbed by previously permitted mining activity. The Proposed Action also includes development of the Bluestar Ridge Mine encompassing 26 acres of which seven have been disturbed by previously permitted exploration roads and drill pads (**Figure 2-7**). Connecting haul and access roads account for 17 acres of new disturbance in the Project area for a total of 43 acres. Soil salvaged with initiation of mining activity in the Genesis-Bluestar Operations Area is described in Section 2.2.1.5 – Reclamation.

Soil type in the 43 acre tract is comprised of the Bucan-Humdun association which occurs on the western flanks of the north-south trending ridge. The Bucan-Humdun association is composed of stony loam and silt loam, derived from loess (windblown [eolian] type of unconsolidated deposit) with a high content of volcanic ash. This soil is deep and well drained. Permeability of this soil type is moderate to slow. Effective rooting depth and depth to bedrock vary from 40 to 60 inches for the Bucan series and over 60 inches for the Humdun series within this association. Runoff is rapid and the hazard of water erosion is high (BLM 1989).

Newmont estimates that less than 100,000 tons of Carlin Formation material would be encountered while mining the Genesis Project. Any Carlin Formation material encountered would be evaluated for reclamation purposes and, if suitable, direct hauled to reclamation areas or stockpiled for future use in reclamation.

3.4.4.2 DIRECT AND INDIRECT IMPACTS

Proposed Action

The proposed Genesis Project would result in 43 acres of new disturbance. Impacts to soil occur in two separate stages during mining operations: 1) impacts during salvaging, when growth media is stockpiled and stabilized in stockpile areas, and 2) soil impacts occurring between final redistribution and completion of reclamation. Most impacts to soil occur during salvage and stockpile operations. Erosion that occurs during and after redistribution of growth media would have a greater effect on final reclamation.

Direct impacts to soil would include modification of chemical and physical characteristics, loss of soil to wind erosion, and decreased biological activity. Chemical changes would result from mixing surface soil with subsoil during salvaging operations. This mixing could reduce organic matter content of surface soil and increase the probability of undesirable salt in subsoil materials being added to surface soil. These changes would lower soil quality. Impacts on physical characteristics of soil during salvage, stockpiling, and redistribution would include mixing, compaction, and pulverization from equipment and traffic. Soil compaction and pulverization would lead to loss of structure, decreased infiltration, permeability, and available water-holding capacity, and loss of finer-grained soil material due to effects of erosion. Soil mixing would reduce organic material and increase coarse fragments in the surface soil.

Soil stockpile locations are selected based on the following criteria: 1) proximity to areas that are to be reclaimed to limit haul distance both during salvage and reclamation operations, 2) areas that are not scheduled for disturbance during the life of mine, 3) areas where sufficient storage capacity is available to hold the volume of growth media to be stockpiled, and 4) adequate area to construct toe berms, runoff control ditches, and sediment pond systems to trap soil.

No estimate of growth media movement from disturbance areas is available because a determination of an amount is dependent on a variety of factors. The time period of bare soil exposure, coarse fragment content of upper material exposed, storm event severity and frequency, amount of wind and direction/aspect/speed of the wind to any given tract, and acres of land that have been disturbed are components of calculating growth media movement. Since these factors vary throughout the life of the mine including the timing of ongoing or concurrent reclamation, it is not possible to provide a meaningful assessment of soil movement from the mining landscape.

Soil losses from wind erosion are potentially high in Nevada's arid, windy climate. The highest potential for loss of salvaged soil would occur during reclamation after redistribution of soil on regraded areas and before revegetation. The volume of soil loss would depend on wind velocity, size and condition of exposed areas, and soil texture.

Soil movement from the reclaimed mine area is expected to exceed the pre-mine conditions until vegetation is established on the reclaimed landscape. During the reclamation period, reclaimed areas would be monitored for areas of poor vegetation establishment or excess erosion and maintenance would be performed to establish the desired plant cover and control erosion. As described in Section 2.3.6 – Surface Water Controls, sediment captured in run-off control ditches and sediment ponds would be periodically returned to soil stockpiles or to reclaimed areas. Capacity of sediment control pond systems would be maintained throughout the mine life and during the post-closure period.

Water erosion potential of soil could occur during heavy precipitation or run-off events due to exposed soil, fine soil texture, soil surface conditions, and slope. As proposed, soil would be placed in a "roughened" condition and/or with exposed surface coarse fragments; effectively reducing wind and water erosion potential.

Reclaimed landforms would be designed to optimize drainage, slope stability, and floral and faunal habitat. In most cases, the tops of the stockpile locations or other disturbance areas would be rounded. These minor swales and hills would drain downward along the slope of the reclaimed area. Minor undulations generally provide some visual barriers for wildlife escape and create different sun exposures; various air or wind flows; a variety of plant habitat; and varied elevation and topographic for wildlife viewing, hiding, and resting. Rounded topography may also provide a windbreak, which can be enhanced by vegetation that provides shelter and habitat for wildlife.

Portions of some facilities have been revegetated (e.g., the lower portion of the Section 5 Waste Rock Disposal Facility) and as such, movement of growth media from upper slopes would be trapped by vegetation on the lower lifts of the facility. Movement of growth media or fine material associated with reclamation of other facilities (e.g., Section 36 Waste Rock Disposal Facility, backfilled pits, haul and access roads, and ancillary facilities) would be controlled by use of runoff ditches and sediment ponds. Sediment controls would remain in place during the post-closure period until sufficient vegetative cover has been established and growth media and fines have stabilized on slopes. Removal of these runoff control systems would only occur upon concurrence with BLM and NDEP.

Redistributed growth media would have lower organic matter content as a result of salvage and stockpiling. Soil biological activity would be reduced or eliminated during stockpiling as a result of anaerobic conditions created in deeper areas of stockpiles.

Redistribution of growth media during reclamation would result in decreased quantity and quality due to compaction from loading, hauling, and placement activities. Movement of growth media down slopes would continue after placement until vegetation is established. As described previously, growth media and fines would be trapped by the runoff control ditch and sediment pond system. Growth media and fines trapped by the runoff control system would be returned to reclaimed areas. Compaction would be reduced by scarifying soil after placement. Scarification would be completed on the contour, which would help reduce potential for sheet erosion.

The proposed Bluestar Ridge Mine would remain as an open pit following cessation of mining operations. Soil salvaged during development of the Bluestar Ridge Mine pit would not be redistributed over the approximately 26 acre mine pit footprint, but would be used during reclamation of associated haul roads and waste rock disposal facilities (Section 5 Waste Rock Disposal Facility).

Under the Proposed Action, in-pit backfilling of mine pits would provide a net increase of about 300 acres of land surface. These areas would be reclaimed in similar fashion as other facilities by regrading to provide proper drainage, ripping to reduce compaction, placement of two-feet of growth media, seedbed preparation, and seeding with an approved seed mix capable of supporting wildlife habitat and livestock grazing.

No Action Alternative

Impacts to growth media on undisturbed portions of the proposed Genesis Project would not occur under the No Action Alternative. Direct and indirect impacts to growth media salvaged from previously authorized mining activity would continue until reclamation is complete. Approximately 450 acres would remain as open mine pits in the Genesis-Bluestar Operations Area under the No Action Alternative.

3.4.4.3 CUMULATIVE EFFECTS

The CESA for soil resources encompasses the Carlin Trend and watersheds that drain the Carlin Trend to the confluence with the Humboldt River (**Figure 3-8**). This study area is based on natural and manmade impacts to soil resources that result in soil movement or loss, soil fertility and productivity, and areas where additive effects of soil movement could impact other resources (e.g., surface water; fisheries and aquatic resources; riparian and wetland habitat).

Soil resources are cumulatively impacted through disturbance and/or removal by mining; natural phenomena such as wildfire; and other land uses including agriculture, grazing, recreation, and other natural and man-caused activities within the analysis area. Wildfire damages the organic component that holds the soil together and makes it susceptible to wind erosion. Intense recreation and grazing practices can cause powdering of the soil, making it susceptible to wind and water erosion. Additive or cumulative effects to soil resources include impacts to soil during salvage, stockpiling, re-distribution, and reclamation efforts associated with 43 acres of new surface disturbance in the Project area. Soil handling and placement during reclamation of land disturbed by previously permitted and future mining activity in the Genesis-Bluestar Operations Area would also result in soil loss; primarily due to wind erosion. Soil movement in response to precipitation would be captured in the sediment control system at the Genesis Project and other mine areas in the CESA.

The cumulative volume of soil that would be lost from the combination of land uses, natural phenomena, and mining has not been quantified. Insufficient data are available to determine the additive volume of sediment that has reported to area watersheds in the past, is currently moving in response to both water and wind erosion, and/or that could be lost in the future.

3.4.4.4 POTENTIAL MITIGATION AND MONITORING MEASURES

No proposed mitigation or additional monitoring measures have been identified by BLM for soil resources. No residual effects to soil resources have been identified resulting from implementation of the Proposed Action.

3.4.5 VEGETATION

3.4.5.1 AFFECTED ENVIRONMENT

The Study Area for vegetation resources is the Genesis Project area (**Figure 3-4**). Some portions of the Genesis Project have been disturbed by previously permitted exploration activity including roads and drill pads. Vegetation on the undisturbed portion of the proposed Genesis Project is typical of upland Great Basin sagebrush/bunchgrass plant community. Major vegetative species present in undisturbed

areas include: mountain big sagebrush, Wyoming big sagebrush, low sagebrush, black sagebrush, Douglas rabbitbrush, rabbitbrush, spiny hopsage, Sandberg bluegrass, bottlebrush squirreltail, bluebunch wheatgrass, Thurber needlegrass, Indian ricegrass, lupine, arrowleaf basalmroot, phlox, and aster. No tree dominant or wetland/riparian plant communities are present in the Project area.

Invasive, Non-native Species

Noxious weeds are defined under Nevada law (NRS 555.005) and the federal Noxious Weed Act of 1974, amended by Section 15 of the U.S. Farm Bill, Management of Undesirable Plants on Federal Lands, as any species of plant that is or is likely to be detrimental or destructive and difficult to control or eradicate. Noxious weeds are damaging to the environment and local economy, and replace desirable vegetation. Often noxious weeds proliferate where native vegetation has been removed or disturbed.

Forty-four species of noxious weeds have been identified in Nevada (NRS 555.101). Common species in Eureka County include leafy spurge (*Euphorbia esula*), Scotch thistle (*Onopurdum acantheum*), tall pepperweed (*Lepidium latifolium*), musk thistle (*Carduus nutans*), spotted knapweed (*Centaurea maculosa*), Russian knapweed (*Centaurea repens*), hoary cress (*Cardaria draba*), and Dyer's woad (*Isatis tinctoria*). Newmont conducts annual weed surveys to direct weed control efforts.

Special Status Plant Species

Special status species of plants with potential to occur in the area include Lewis buckwheat, Grimes vetchling, least phacella, cactus, and Lieberg clover. None of these species were identified during field surveys conducted in conjunction with the Section 36 Project EA (BLM 1995). Based on habitat features described in Cronquist *et al.* (1989) and Kartesz (1988), there is a low probability that these plant species (except cactus) are present on or near the Project area due to land disturbance associated with current mining operations.

3.4.5.2 DIRECT AND INDIRECT IMPACTS

Proposed Action

Approximately 43 acres of vegetation occurring in the Project area would be directly affected as result of excavation of the Bluestar Ridge Mine Pit and construction of haul roads. About seven acres of the 26 acre Bluestar Ridge Mine footprint have been previously disturbed by exploration activities (e.g., roads and drill pads). The Bluestar Ridge Mine would not be backfilled and remain as an open pit following completion of mining operations; approximately 17 acres associated with haul roads, and exploration activity in the Project area would be revegetated.

The proposed reclamation plan (backfilling pits) would provide a net increase of about 300 acres of land surface that would be reclaimed to a desired plant community. The proposed reclamation plan would result in restoration of some habitat for wildlife and, when combined with reclamation in adjacent areas, serve to establish habitat links to other areas.

Dust from roads and mining activities could coat vegetation in areas adjacent to or downwind from dust sources. Dust on vegetation predisposes some species to insect infestation. Control of fugitive dust on haul and access roads through use of water and chemical binders as proposed would reduce the amount of dust that would settle on vegetation.

With the exception of areas revegetated with sagebrush, concurrent revegetation during and after mining would likely reestablish permanent and stable vegetation cover within five to ten years, assuming livestock use in the area is deferred and noxious weeds are controlled. Sagebrush requires a lengthier time to reestablish. Typically, communities of sagebrush have proven difficult to re-establish on reclaimed land (Schuman and Booth 1998; Vicklund *et al.* 2004). Reclaimed plant communities would likely differ in species composition from native pre-mining communities. Reclaimed areas would be dominated by grasses with low densities of native forbs and shrubs. Big sagebrush, a dominant shrub in the Project area, would likely be present at lower densities following mining.

Invasive, Non-native Species

Disturbed sites and recently seeded areas are candidates for invasion by undesirable species such as noxious weeds. Indirect effects of the Proposed Action would include potential introduction of weedy species from reclaimed areas to adjacent stands of native vegetation.

Newmont's weed control program is described in Section 2.2.1.6 – Invasive, Nonnative Species. Monitoring weed infestations and weed control are ongoing and would continue until reclamation is complete and potential for weed invasion is minimized. Noxious weed control methods associated with the Proposed Action would control the invasion of weeds onto the mine area and reduce the potential for the mine area to be a source of noxious weed seed for adjacent, uninfested areas. Successful reclamation would result in a vegetation community that would be less susceptible to weed invasion.

Special Status Plant Species

With the exception of cactus, no other special status plant species have been identified in the Project area and therefore would not be affected by the Proposed Action. Populations of cactus are protected under Nevada law. Should more than 50 percent cactus coverage be encountered during mine development, Newmont may be required to obtain a permit to remove cactus. This permit may only be required if the cactus is to be sold (BLM 2008b; Westech 2004; NRS 527.060.120).

No Action Alternative

Vegetation resources would not be impacted by implementation of the No Action Alternative since ground disturbance associated with mining activities would not occur. Impacts to vegetation associated with previously authorized ground disturbing activities in the area would continue. Under the No Action Alternative approximately 450 acres would remain as open pits and not be reclaimed.

Invasive, Non-native Species

Newmont would continue monitoring weed infestations and weed control programs until reclamation of currently authorized disturbances is complete and potential for weed invasion is minimized.

Special Status Plant Species

Special status plant species would not be affected by implementation of the No Action Alternative since no ground disturbance associated with mining activities would occur.

3.4.5.3 CUMULATIVE EFFECTS

The CESA for vegetation encompasses the Carlin Trend and extends north and east to include mule deer, pronghorn antelope, and sage grouse seasonal habitats (**Figure 3-11**). Past, present, and reasonably foreseeable mining developments in the Carlin Trend includes a contiguous area that provides crucial seasonal habitat for mule deer, a species of concern because of loss of habitat associated with cumulative impacts on vegetation from wildfires and other activities.

The cumulative effects discussion for vegetation focuses on changes in dominant plant communities that effect habitat for wildlife (i.e., sagebrush/grasslands). Wildfires combined with displacement of native species by invasive annual grasses are the primary factors that have altered the structure, composition, and ecology of plant communities in the CESA (BLM 2007a, 2007b).

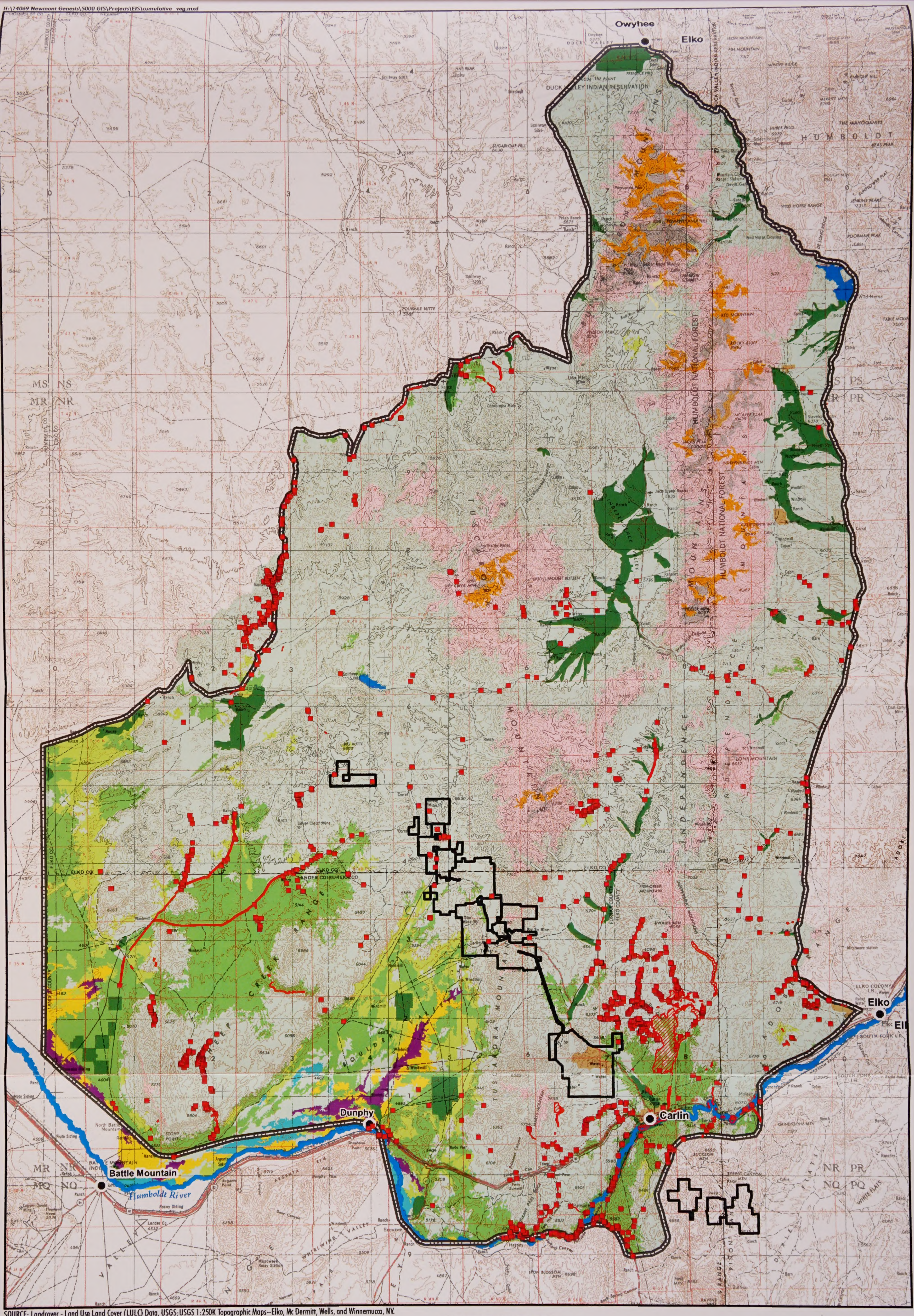
The primary past, present, and reasonably foreseeable changes that have affected vegetation in the CESA include wildfires, livestock grazing, mining, and exploration activity. Existing mining and exploration projects are listed in **Table 3-1** and reasonably foreseeable mine development in the Carlin Trend from 2009 to 2022 (including 43 acres for the Genesis Project) is also shown in **Table 3-1**.

The vegetation cover types within the CESA include agriculture, aspen, grassland, greasewood, Great Basin subalpine pine, lowland riparian, mountain riparian, mountain sagebrush, mountain shrub, sagebrush, sagebrush/perennial grass, salt desert scrub, subalpine fir, urban, and water. The distribution of vegetation cover types in these areas is strongly influenced by variations in landscape position, soil type, moisture, elevation, and aspect. Species nomenclature herein is consistent with the USDA NRCS Plants Database (USDA NRCS 2009). **Figure 3-11** illustrates the vegetation cover types present within the CESA. **Table 3-7** summarizes acreages for each vegetation cover type within the CESA. It should be noted that the vegetation cover type within the 43-acre Genesis Expansion Study Area is classified as Sagebrush/Perennial Grass.

Approximately 41,000 acres has been disturbed or would be disturbed by mining activity in the Carlin Trend. This acreage represents approximately 0.5 percent of the land area in the CESA. Based on current approved mine and reclamation plans, approximately 7,800 acres would remain as open pits after closure and reclamation of mine sites. Once dewatering activity ceases, some pits would form pit lakes from re-establishment of the groundwater table.

The Proposed Action would increase disturbance to vegetation by 43 acres and would result in a net increase of approximately 300 acres of land surfaces that would be reclaimed to a desired plant community. These areas would provide habitat for wildlife and, when combined with reclamation in adjacent areas, serve to establish habitat links to other areas. As other portions of the Carlin Trend are reclaimed per approved plans, reclamation would modify the habitat from predominantly shrub components to grassland. Loss of mature shrubs associated with land disturbed by mining would represent a small percentage of the acres of woody species communities in the CESA.

H:\14069 Newmont Genesis\5000 GIS\Projects\EIS\cumulative_veg.mxd



SOURCE: Landcover - Land Use Land Cover (LULC) Data, USGS;USGS 1:250K Topographic Maps--Elko, Mc Dermitt, Wells, and Winnemucca, NV.

VEGETATION TYPES

N

0 Miles 10

- Weed Infestation Point
- Weed Infestation Line
- Weed Infestation Area
- Cumulative Effects Study Area
- Plan Boundaries
- Aspen
- Great Basin Subalpine Pine
- Sub Alpine Fir
- Greasewood
- Mountain Sagebrush
- Mountain Shrub
- Sagebrush
- Sagebrush/Perennial Grass
- Salt Desert Scrub
- Grassland
- Agriculture
- Lowland Riparian
- Mountain Riparian
- Urban
- Water

Vegetation Resources and Weed Infestation Locations Cumulative Effects Study Area
Genesis Project
Eureka County, Nevada
FIGURE 3-11

TABLE 3-7
Vegetation Cover Types in the Cumulative Effects Study Area (CESA)[1]
Genesis Project

Vegetation Cover Type	Approximate Acreage
Agriculture	91,529
Aspen	30,301
Grassland	81,603
Greasewood	16,969
Great Basin Subalpine Pine	1,665
Lowland Riparian	10,303
Mountain Riparian	861
Mountain Sagebrush	30,2398
Mountain Shrub	29,124
Sagebrush	284,239
Sagebrush/Perennial Grass	1,561,204
Salt Desert Scrub	29,600
Sub Alpine Fir	285
Urban	5,632
Water	2,526
Total	**2,448,240**

[1]Vegetation cover types were compiled based on USGS SWReGAP data. As such, spatial limitations are attributed to this data set because it was collected on a regional landscape level. Note that these data (i.e., vegetation cover types and associated acreages) are approximate.
Source: USGS 2009.

Similarly, wildfire has affected mature shrub communities throughout the CESA. Approximately one million acres have burned since 1999 which represents approximately 16 percent of the area. Effects on vegetation include loss or partial removal of upland species, potential removal of below ground biomass, soil hydrophobicity, and potential for increasing spread of noxious weeds and invasive grasses. Depending on the severity of the fire at any given location and the success of reseeding and planting programs, reestablishment of shrub communities may take several decades to achieve. Partial re-colonization is occurring in some areas where adjacent seed sources are available.

Cumulative effects on invasive and non-native species result from wildfire, livestock use, recreation, and mining disturbance in the Carlin Trend. Disturbed sites and recently seeded areas are candidates for invasion by undesirable species such as noxious weeds and cheatgrass. Aggressive revegetation and weed control programs would help prevent establishment of weed infestations on reclaimed sites.

3.4.5.4 POTENTIAL MITIGATION AND MONITORING MEASURES

No proposed mitigation or additional monitoring measures have been identified by BLM for vegetation resources. No residual effects on vegetation resources resulting from implementation of the Proposed Action have been identified.

3.4.6 TERRESTRIAL WILDLIFE

The Study Area for terrestrial wildlife includes the north half of the Genesis-Bluestar Operations Area as shown on **Figure 3-4**.

3.4.6.1 AFFECTED ENVIRONMENT

Wildlife habitat values in the Genesis Project area have been degraded by development of mining related facilities. With the exception of approximately 43 acres of sagebrush/grassland habitat in the proposed Project area, existing environmental conditions include open mine pits, waste rock disposal facilities, exploration roads and drill pads, haul roads, and other ancillary facilities used in conjunction with previously authorized and ongoing mining operations. Wildlife species and habitats found within the Study Area are typical of the Great Basin region. Wildlife populations and use of the proposed Project area are low for most species throughout the year due to the lack of water, lack of vegetation; high level of human disturbance, and isolation of the area from contiguous habitat.

Big Game Species

The Study Area consists of low-density sagebrush/grassland habitat. The area provides some transitional habitat for mule deer during spring and fall migration, when use by mule deer is seasonally high (Miller 2009a). Population numbers for mule deer in game management unit 068 for Elko and Eureka counties have been steadily declining for the last ten years primarily due to the effects of fire on winter range quality (NDOW 2008).

The Little Boulder Valley was once the location of a historic mule deer migration corridor supporting movement to and from winter range in the Dunphy Hills. Historically, up to 4,000 deer would migrate through this area twice annually. With development of mining in the Carlin Trend, deer moved their migration pattern to the east side of the South Tuscarora Range. As mine development increases on the east side of the range, limited opportunity remains for north – south movement along the range (NDOW 2008).

Use of the Study Area by pronghorn is highly dependent on water and forage availability. The Study Area contains both low density and crucial winter range for pronghorn. The pronghorn population is now close to carrying capacity in Game Management Unit 068 (NDOW 2008).

Elk were first observed in the Independence Mountains in the mid-1980s and have increased to a population of approximately 420 animals (NDOW 2008). Elk have been observed moving from the Maggie Creek Narrows to forage on adjacent reclaimed areas. Typically, elk are present in winter on Bob's Flat and Richmond Mountain near the southern end of the Tuscarora Mountains. Seasonal migration routes and timing of migration have not been well documented although some elk migrate to Marys Mountain during summer (BLM 2007a, 2007b).

Mountain lions are classified as a big game species in Nevada. Mountain lions are fairly common in north-central Nevada and occupy the higher elevations surrounding the Study Area (NDOW 2008). They often travel between mountain ranges and valleys depending on prey availability.

Small Game Species

Upland game birds may occupy portions of the Study Area, although habitat is limited. Species that may occur in the Study Area are greater sage-grouse, chukar, Hungarian partridge, and mourning dove. Small flocks of chukar, an introduced species, have been observed in the area on steep slopes and rocky areas. Gray partridge habitat is marginal and these birds have not been observed in the proposed Project area. Mourning doves are transitory in the area during spring and fall migration and are not known to nest within the Study Area (BLM 1996). Due to the lack of habitat, waterfowl or shorebirds do not occur in the Study Area.

Other small game mammal species that could occur within the Study Area are mountain cottontail and black-tailed jackrabbit.

Furbearers that may occur within the Study Area include the badger, gray fox, kit fox, bobcat, and raccoon (Hall 1995). Additional mammals that may be found within the Study Area include coyote, long-tailed weasel, short-tailed weasel, spotted skunk, and striped skunk.

Nongame Species

A diversity of nongame species (e.g., small mammals, passerines, raptors, amphibians, and reptiles) occur within the Study Area. The sagebrush/grassland habitat supports a variety of resident and seasonal nongame species. Nongame mammals include the deer mouse, Merriam's shrew, sagebrush vole, golden-mantled ground squirrel, least chipmunk, and woodrat. Rodent populations provide a prey base for the area's predators.

Passerine or songbird species occasionally occur within the Study Area. However, due to the lack of water, a low level of plant diversity and structure, fewer potential nesting sites, and diminished food base, the Study Area does not support a high diversity of bird species.

Several raptor species have been documented within the vicinity of the Study Area including the golden eagle, prairie falcon, American kestrel, red-tailed hawk, great-horned owl, short-eared owl, and western burrowing owl (BLM 2008a). No known raptor nests exist within the Study Area. Golden eagles have been observed in the Study Area vicinity, but no nests have been recorded. Prairie falcons have been recorded approximately 20 miles southwest of the Study Area along Rock Creek (BLM 2008a). Burrowing owls have been recorded nesting approximately 15 miles northwest of the Study Area along Boulder Creek (BLM 2008a).

Twenty-eight species of reptiles and amphibians have been identified in the BLM Elko District. The diversity of species in the area is likely limited by the cool, dry climate of northeastern Nevada. Nine amphibian and reptile species have been identified in the Little Boulder Basin: Great Basin spadefoot toad, Pacific treefrog, desert horned lizard, long-nose leopard lizard, northern sagebrush lizard, Great Basin western fence lizard, western yellow-bellied racer, red coachwhip, and Great basin gopher snake. Great Basin whip-tailed lizard and Great Basin rattlesnake have been documented in the Boulder and Bell creek drainages (BLM 2002).

Migratory Birds

Migratory bird species are protected under the Migratory Bird Treaty Act (MBTA) (16 USC 703-711) and Executive Order (EO) 13186 (66 Federal Register [FR] 3853). Pursuant to EO 13186, a draft MOU among the BLM, USFS, and USFWS was drafted in order to promote conservation and protection of migrating birds. Specific measures to protect migratory bird species and their habitats have not been identified within EO 13186, but instead, the EO provides guidance to agencies to promote BMPs for conservation of migratory birds. As a result, the BLM Nevada State Office prepared Migratory Bird BMPs for the Sagebrush Biome to assist BLM field offices in the consideration of migratory birds in land management activities (BLM no date).

Before any new disturbance activities commence, avian surveys will be conducted during the breeding season for the majority of migratory bird species (March 15 – July 30). A 14-day window for disturbance is imposed if surveys occur between March 15 and May 1. Disturbance must commence within 14 days of the completion of the survey to be within compliance. If disturbance does not occur within 14 days a new survey is required. If the initial survey takes place after May 1, a single survey will suffice and the 14 day restriction will not be imposed (Burton 2009). Disturbance can commence at any time after the survey completion. Surveys will be conducted by a qualified biologist. The survey results and the discovery of any nesting sites will be reported to BLM and the NDOW and a suitable buffer will be determined depending on species. Site reporting may be done at initial encounter by the surveying biologist and resolved before submission of the report.

Special Status Species

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Forty-six special status wildlife species were identified as potentially occurring within the Study Area (BLM 2008a). Occurrence potential within the Study Area was evaluated for each species based on their habitat requirements and/or known distribution as described in the Draft Supplemental Environmental Impact Statement Betze Pit Expansion Project (BLM 2008a). Special status wildlife species identified as potentially occurring within the Study Area are described below.

Special Status Mammal Species

Bats

Federal and state sensitive bat species that have been identified as potentially occurring within or near the Study Area include the pallid bat, Townsend's big-eared bat, big brown bat, California myotis, western small-footed myotis, Yuma myotis, western pipistrelle, and Brazilian free-tailed bat (BLM 2008a). Suitable foraging habitat is present in portions of the Study Area.

Preble's Shrew

Preble's shrew is found in a wide variety of habitats in Nevada including arid grasslands and shrublands, wetland and forest edges, and alpine tundra. The Preble's shrew is active year-round and at any time throughout the day or night, but is probably most active during morning and evening hours (NDOW

2006). The Preble's shrew resembles other shrews, feeding primarily on insects and other small invertebrates such as worms, mollusks, and centipedes (NDOW 2006). The Preble's shrew has been documented in northern Elko County, and suitable habitat occurs within the Study Area (BLM 2002).

Fletcher Dark Kangaroo Mouse

This species is found throughout Nevada in a wide variety of habitats including intermountain desert scrub, sagebrush grasslands, badlands, desert playas, and ephemeral pools (NDOW 2006). This species' primary food source is seeds, but it may also eat insects. It does not appear to use free water and is believed to store food in seed caches within burrow systems (NDOW 2006). Activity for this species has been observed March to October with peak nocturnal activity occurring in the first two hours after sunset (NDOW 2006). Suitable habitat occurs within the Study Area.

Pygmy Rabbit

The pygmy rabbit is distributed throughout the northern Great Basin, primarily in rocky habitats dominated by dense stands of big sagebrush and rabbitbrush, particularly in floodplain habitats. Pygmy rabbits usually remain near dense cover, where rabbits excavate burrows and create trail systems in the understory. Sagebrush is important forage for this rabbit and is consumed year-round. This species has been recorded near the Leeville Project south of the Genesis-Bluestar Operations Area (BLM 2002). Suitable habitat occurs in the Study Area.

Special Status Bird Species

Swainson's Hawk

The Swainson's hawk is a summer resident of Nevada and, like the golden eagle, is most abundant in the northern third of the state (Herron *et al.* 1985). The majority of documented breeding territories in Nevada have been located in agricultural valleys. Swainson's hawks nest in a wide variety of vegetative communities from 4,000 to 6,500 feet in elevation. Nest sites primarily are found in deciduous trees. However, nests also have been documented in other vegetation types such as buffaloberry, serviceberry, and sagebrush (Herron *et al.* 1985). Swainson's hawks begin nesting in April, and young typically fledge by July. This species has been observed nesting within the Project vicinity but no known nest sites occur within the Study Area (BLM 2002, 2008a). Suitable foraging habitat is located within the Study Area.

Ferruginous Hawk

The ferruginous hawk commonly breeds in many areas of Nevada. This species often nests in trees, on promontory points, rocky outcrops, cut banks, or on the ground. Preferred breeding habitat in most of the state is scattered juniper forests at the interface between piñon-juniper and desert shrub communities that overlook broad valleys used for foraging (Herron *et al.* 1985). Ferruginous hawks begin nesting in March, and young fledge by July. This species has been observed nesting within the Project vicinity but no known nest sites occur within the Study Area (BLM 2002, 2008a). Suitable foraging habitat occurs within the Study Area.

Golden Eagle

The golden eagle is a year-long resident and is considered to be commonly breeding throughout Nevada; however, eagle densities and nesting activity are greatest in the northern third of Nevada (Herron *et al.* 1985). Nesting golden eagles prefer suitable cliffs that overlook sagebrush flats, piñon-juniper forests, salt desert shrub, or other habitat capable of supporting a suitable prey base. Highest densities of nesting eagles typically are found along river systems where cliffs border the entire length of the river, and lower densities are found in piñon-juniper habitat and salt desert shrub communities (Herron *et al.* 1985). Golden eagles begin nesting in March, and young fledge by July. Wintering golden eagles tend to congregate in broad valleys interspersed with agricultural croplands or sagebrush and desert shrub communities. This species has been recorded flying over the Study Area and suitable nesting habitat exists approximately 20 miles southwest of the Study Area (BLM 2008a). Suitable foraging habitat exists within the Study Area.

Prairie Falcon

Prairie falcons range throughout the Great Basin and are permanent residents of Nevada. Habitat requirements include steep cliff ledges and outcrops for nesting that border semi-arid valleys (BLM 2005). The highest nesting densities in Nevada occur in northern counties, particularly located in or near the mouth of narrow canyons, overlooking riparian vegetation and agricultural lands (Herron *et al.* 1985). Prairie falcons begin nesting in March, and young typically fledge by July. This species has been recorded flying over the Study Area (BLM 2008a). Suitable foraging habitat occurs within the Study Area, and nesting habitat occurs approximately 20 miles southwest of the Study Area.

Greater Sage Grouse

The greater sage-grouse is found throughout Nevada in sagebrush-dominated habitats. Sagebrush is a key component of greater sage-grouse habitat on a yearlong basis (Northeastern Nevada Stewardship Group [NNSG] 2004). Sagebrush provides forage and nesting, security, and thermal cover for this species. Moist areas that provide succulent herbaceous vegetation during the summer months are used extensively as brood rearing habitat. Open, often elevated areas within sagebrush habitats usually serve as breeding areas (strutting grounds or lek sites) (NNSG 2004). During winter, greater sage-grouse often occupy wind exposed areas where sagebrush is available (e.g., drainages, southern or western slopes, or exposed ridges).

The nearest active lek occurs approximately 5.5 miles north of the Study Area and is considered in the cumulative effects analyses. Greater sage-grouse males begin displaying on leks in March, and hens typically begin nesting in April and May. Sage grouse have been observed in the area and are typically associated with sagebrush habitats in rolling hills and benches along drainages (BLM 2002). Nesting and brood-rearing activities are not likely to occur in the Study Area due to the lack of water and suitable habitat. Some winter habitat for greater sage-grouse is present in the Study Area.

Burrowing Owl

The burrowing owl is known to breed throughout Nevada. The majority of the breeding population is known to migrate from northern Nevada during the winter months. However, observations of this owl

have been recorded throughout Nevada during all months of the year (Herron *et al.* 1985). Breeding by burrowing owls is strongly dependent on the presence of burrows constructed by prairie dogs, ground squirrels, or badgers. Prime burrowing owl habitat must be open, have short vegetation, and contain an abundance of burrows. Burrowing owls begin nesting in April, and young typically fledge by August. This species has been observed nesting approximately 15 miles northwest of the Study Area (BLM 2008a). No known nest sites occur within the Study Area. Suitable foraging habitat exists within the Study Area.

Short-Eared Owl

Short-eared owls are year-round residents of Nevada, although few nest sites have been identified. The species tend to nest in meadow and wetland habitats (Herron *et al.* 1985). Short-eared owls forage in open areas and are known to nest and roost on the ground. This species begins nesting in February, and young typically fledge by July. This species has been documented within the Boulder Valley (JBR 1996). Suitable nesting and foraging habitat occurs within the Study Area.

Loggerhead Shrike

The loggerhead shrike is a common resident throughout Nevada. This species is found in open grasslands along valley floors and foothills of the Great Basin. In Nevada, it is commonly found in scrub habitat types such as sagebrush and greasewood. Loggerhead shrikes prefer shrubs or small trees for nesting, but nesting also can occur in piñon-juniper woodlands. The breeding season for this species is April 15 to July 15. This species can be found perching on wire, fences, or poles (NGS 1983). This species has been observed in the Carlin Trend (BLM 2002). There is suitable nesting and foraging habitat within the Study Area. The potential for this species to occur within the Study Area is considered high.

Vesper Sparrow

The vesper sparrow is a summer resident that occurs in various open shrub habitats from high elevation valleys to higher mountain slopes and basins (Floyd *et al.* 2007). This species occurs from approximately 5,500 feet in elevation in the foothills of northern Nevada to approximately 9,000 feet in elevation in surrounding mountain ranges. Open areas with a scattered canopy of big sagebrush and a minimum ground cover of 20 percent grasses, forbs, and young shrubs appear to be the preferred nesting habitat for this species (Floyd *et al.* 2007). Nests normally are placed on the ground under or near shrubs. The breeding season for this species is April 15 to July 15. Diet consists of seeds and insects (Neel 1999). There is suitable nesting and foraging habitat within the Study Area.

3.4.6.2 DIRECT AND INDIRECT IMPACTS

The primary issues related to wildlife and special status species include: disruption of big game movements and loss or alteration of native habitats, increased habitat fragmentation, animal displacement, and direct loss of animals. Potential direct and indirect impacts of the proposed Project on terrestrial wildlife can be classified as short-term and long-term. Short-term impacts arise from habitat removal and disturbance as well as from activities associated with mine operation; these impacts would cease upon mine closure and completion of successful reclamation. Long-term impacts consist of permanent changes to habitats and the wildlife populations that depend on those habitats, irrespective of reclamation success. Direct impacts to wildlife populations could include limited direct mortalities from

mining operations, habitat loss or alteration, incremental habitat fragmentation, and animal displacement. Indirect impacts could include increased noise, additional human presence, and the potential for increased vehicle-related mortalities.

Human Presence and Noise

The most common wildlife responses to noise and human presence are avoidance or accommodation. Avoidance would result in displacement of animals from an area larger than the actual disturbance area. The total extent of habitat loss as a result of the wildlife avoidance response is impossible to predict since the degree of this response varies from species to species and can even vary between individuals of the same species. Also, after initial avoidance of human activity and noise-producing areas, certain wildlife species may acclimate to the activity and begin to reoccupy areas formerly avoided. Big game species have demonstrated the ability to acclimate to a variety of activities as long as human harassment levels do not increase substantially (Ward 1976). Therefore, it is possible that the extent of displacement would approximate the actual disturbance area after the first few years of mine operation (Ward 1976). In addition to avoidance response, increased human presence intensifies the potential for wildlife/human interactions ranging from harassment of wildlife to poaching and legal harvest.

Potential effects related to increased human presence in the Study Area include: expansion of an existing mine site where human activity associated with mining operations is ongoing; and the location of the mine site is in close proximity to a number of other mining operations in the Project vicinity (e.g., Barrick's Betze/Post Mine and Newmont's Leeville and Lantern mines) that currently experience relatively high human presence and noise levels.

The number of personnel traveling to and from the proposed Project could increase from existing levels, and the potential for increased wildlife mortalities from collisions with mine-related vehicles would likely increase as well.

Hazardous Materials Spill

The potential for wildlife exposure to hazardous materials as a result of a transportation-related spill would be greatest if an accident were to occur near aquatic habitats. There are no aquatic habitats in the Project area. Spills on dry land habitat would pose only minimal risk to most wildlife species since these spills would be adjacent to access roads and highways and could be rapidly contained and cleaned up.

A diesel spill has the potential to contaminate soil, surface water, and groundwater in addition to harming aquatic life and vegetation. Although unlikely, such a spill also could ignite from an accident and cause a range fire. Since cleanup actions would take place immediately, diesel contamination has a low potential to result in long-term impacts to soil and groundwater.

Proposed Action

The addition of 43 acres of new disturbance to the existing Genesis-Bluestar Operations Area is not expected to result in a permanent adverse effect on wildlife populations. In-pit backfilling of mine pits would reestablish land surfaces that would be reclaimed to a desired plant community. The proposed

reclamation plan would result in restoration of some habitat for wildlife and, when combined with reclamation in adjacent areas, serve to establish habitat links to other areas. In-pit backfill would provide a net increase of approximately 300 acres of land surface capable of supporting wildlife habitat and livestock grazing.

The Proposed Action would result in direct loss of 43 acres of sagebrush/grassland habitat, of which about seventeen acres would be reclaimed as sagebrush/grassland habitat. About 26 acres would remain as an open pit and represents a permanent loss of sagebrush/grassland habitat. Direct loss of habitat would eliminate forage, hiding cover, breeding sites for small mammals and birds, and nesting cover. Habitat loss or alteration would result in direct losses of smaller, less mobile species of wildlife, such as small mammals and reptiles, and the displacement of more mobile species into adjacent habitats. In areas where habitats are at, or near, carrying capacity, animal displacement could result in some unquantifiable reductions in local wildlife populations. New mine-related surface disturbance also would result in an incremental increase in habitat fragmentation at the mine site until reclamation has been completed and vegetation re-established.

Animals also may be displaced from habitat adjacent to disturbed areas by increased activity, noise, and dust. Eventually, some animals may adapt to and re-inhabit undisturbed areas. As reclamation occurs, wildlife populations would re-inhabit the area. As reclamation vegetation matures and begins to resemble the original vegetation in composition and density, wildlife use of the area may approach pre-mining levels.

Impacts from dust, exhaust fumes, and other air pollutants on wildlife may include temporary or permanent displacement due to reduced palatability of vegetation. Impacts would occur primarily downwind from mining activity.

<u>Big Game Species</u>

Though all of the Project area lies within potential mule deer range, most of the area is sub-optimal or has been impacted by other mining activities, and therefore use is low throughout most of the year. Most of the mule deer that migrate through the area, moving between summer ranges to the north and winter ranges to the south, now use the eastern flanks of the Tuscarora Range (BLM 2002). However, NDOW has identified a migration corridor located in the southeast portion of the Genesis-Bluestar Operations Area that is seasonally used by mule deer (Gray 2009).

Potential direct impacts to mule deer would include the incremental long-term reduction of forage and increased habitat fragmentation from vegetation removal associated with mining operations. The loss of vegetation would result in an incremental reduction in the amount of available low density habitat in the Study Area.

With ongoing mining activity in the proposed Project and adjacent areas, some animals that traditionally use the area may remain longer on summer range and become stressed by snow accumulation and scarcity of browse. Ground disturbing activities displace migration movements for mule deer to higher elevations rather than lower elevations (Miller 2009b). Some animals may also remain longer on crowded winter ranges that have been depleted of forage. Stress from displacement and insufficient or poor quality food can lead to mortality from starvation, disease, increased predation, and reduced reproductive success.

A small but unquantifiable addition to mule deer mortality may occur when migrating through the area because of potentially greater levels of stress and increased competition with other mule deer. An increase in mortality caused by collisions with vehicles would be expected as a direct result of higher volumes of traffic associated with the proposed Project.

The Proposed Action would not impact current migration of mule deer because there is no migration currently occurring in the proposed Project area, which is roughly half of the overall operations area for Genesis-Bluestar. Migration could be re-established on historic routes upon, or prior to, completion of reclamation.

Impacts to pronghorn would be similar to those discussed above for mule deer. Potential direct impacts would include the incremental long-term reduction of low density and crucial winter habitat. Due to the lack of water the proposed Project area receives limited use by pronghorn.

Impacts to mountain lions would be expected to be minimal, based on the infrequent occurrence of the species within the Study Area.

Small Game Species

The Proposed Action would have a similar impact on small game species (e.g., chukar, mourning dove, pygmy rabbit, and black-tailed rabbit) as described for big game with the permanent loss of 26 acres of vegetation associated with the Bluestar Ridge Pit. This acreage loss would be offset by backfill and reclamation of 300 acres of existing mine pits compared to 450 acres of open pits that would remain under the No Action Alternative. In-pit backfilling of mine pits would reestablish land surfaces that would be reclaimed to a desired plant community. Direct impacts to small game populations would include limited direct mortalities from mining operations, habitat loss or alteration, incremental habitat fragmentation, and animal displacement. Indirect impacts could include increased noise, additional human presence, and the potential for increased vehicle-related mortalities.

In most instances, suitable habitat adjacent to new disturbance areas would be available for use by these species. However, displacement would increase competition and could result in some local reductions in wildlife populations if adjacent habitats are at carrying capacity. Potential impacts also could include nest and burrow abandonment or loss of eggs or young.

Nongame Species

Direct impacts to nongame species (e.g., small mammals, passerine, raptors, amphibians, and reptiles) would be similar to those described above for small game species.

Migratory Birds

Direct loss of habitat would eliminate forage, hiding cover, breeding sites for small mammals and birds, and nesting cover. Direct impacts to migratory birds would be similar to those described above for small game species.

Special Status Species

The Proposed Action would not likely impact any special status species due to the lack of water and preferred habitat available in the proposed Project area. Impacts to special status species would be minimal when considered in a regional context. Direct impacts to special status species would be similar to those described above for small game species.

No Action Alternative

Under the No Action Alternative approximately 450 acres encompassing the Bluestar, Beast, and Genesis pits would not be backfilled and would remain as open pits at the end of existing authorizations. Unreclaimed mine pits would represent an additive permanent loss of sagebrush/grassland habitat in the Carlin Trend. Mine pits left open at the end of mining would also create a permanent loss of potential to re-establish transitional wildlife habitat and migration routes to other undisturbed areas in the Carlin Trend. A pit lake of about 41 acres would begin to form in the Genesis Pit about 100 years after cessation of dewatering activities at the Betze/Post and Leeville mines.

Under the No Action Alternative, the Genesis Project would continue to operate at current levels under existing authorizations into 2010. Impacts from existing and ongoing mining operations occurring under current authorizations have been evaluated and disclosed in previous Environmental Assessments prepared by BLM. These documents are described in **Table 1-1**.

3.4.6.3 CUMULATIVE IMPACTS

The cumulative effects discussion for wildlife emphasizes potential effects to mule deer, pronghorn antelope, elk (important big-game animals), small game, nongame, and special status species (e.g., threatened, endangered, candidate, and sensitive species) for which reductions in important habitats (primarily sagebrush/grassland) have affected populations within the CESA. The proposed surface disturbance (43 acres) associated with the Genesis Project would have minimal additive effect on wildlife habitat in the Carlin Trend. Habitat reduction and fragmentation has been incrementally increasing from existing mining operations in the Genesis-Bluestar Operations Area for over 20 years. Traditional mule deer migration routes throughout the Carlin Trend have been disrupted by mining operations resulting in increased use and reliance on the few key corridors previously identified (Gray 2009).

The CESA for other terrestrial species associated with sagebrush/grasslands include small mammals, passerine birds, waterfowl, and raptors, as well as amphibians, reptiles, and invertebrates would include the surface water drainages shown on **Figure 3-8**.

The CESAs for mule deer, antelope, and sage grouse encompasses a portion of NDOW Wildlife Management Area 6 and are shown on **Figures 3-12, 3-13,** and **3-14**. The CESAs were determined by BLM and NDOW and include contiguous areas that provide crucial seasonal habitat for mule deer and sage grouse, species of concern because of habitat losses associated with wildfires and mining. The CESA for mule deer extends from the northern end of the Independence Range in the North to the Piñon Range in the South (**Figure 3-12**). The CESA for pronghorn antelope (**Figure 3-13**) and sage grouse (**Figure 3-14**) encompasses the northern portion of the mule deer area.

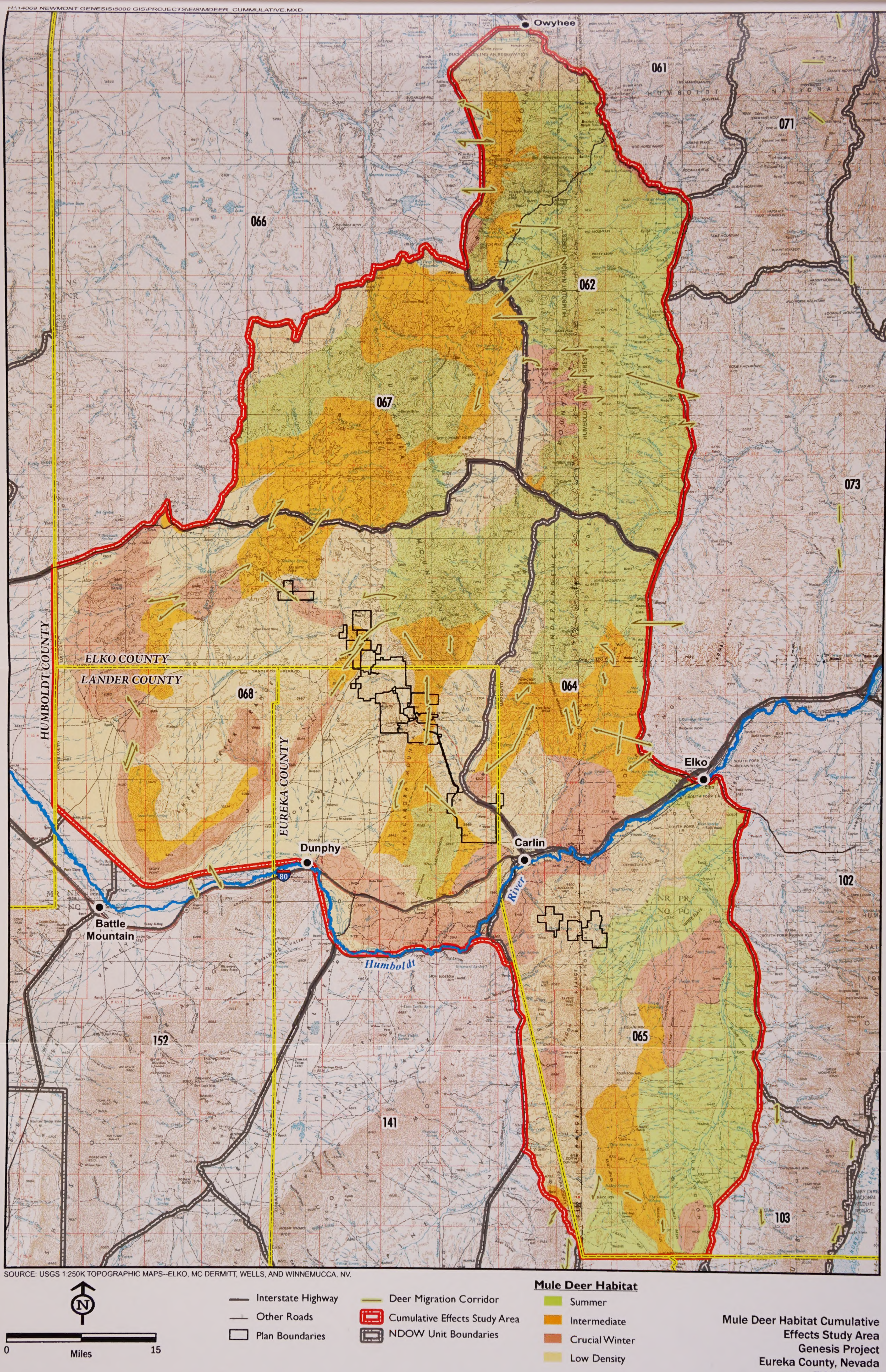
Cumulative effects on wildlife in the CESAs have resulted primarily from wildfires, mineral exploration, mining activities, non-native invasive weeds, livestock grazing, drought, urbanization, and seeding of native range with introduced herbaceous species (BLM 2007a, 2007b). Other industrial development activities in the area such as a power plant, transmission lines, and roads also contribute to impacts to wildlife (BLM 2007a). Development of reasonably foreseeable mine projects would impact wildlife in their respective CESAs; however, mine areas proposed for development have been the site of human activity including exploration drilling and environmental monitoring programs or are within or adjacent to existing mine areas (BLM 2007a, 2007b). Wildlife has either moved from these areas or has become habituated to the activity and remains in the general area.

Mining has removed wildlife habitat, primarily as a function of fencing and/or land disturbance associated with mining operations. Wildfire has created the primary cumulative effect on the general wildlife, mule deer, pronghorn, and sage grouse Study Areas (**Figures 3-12, 3-13, and 3-14**).

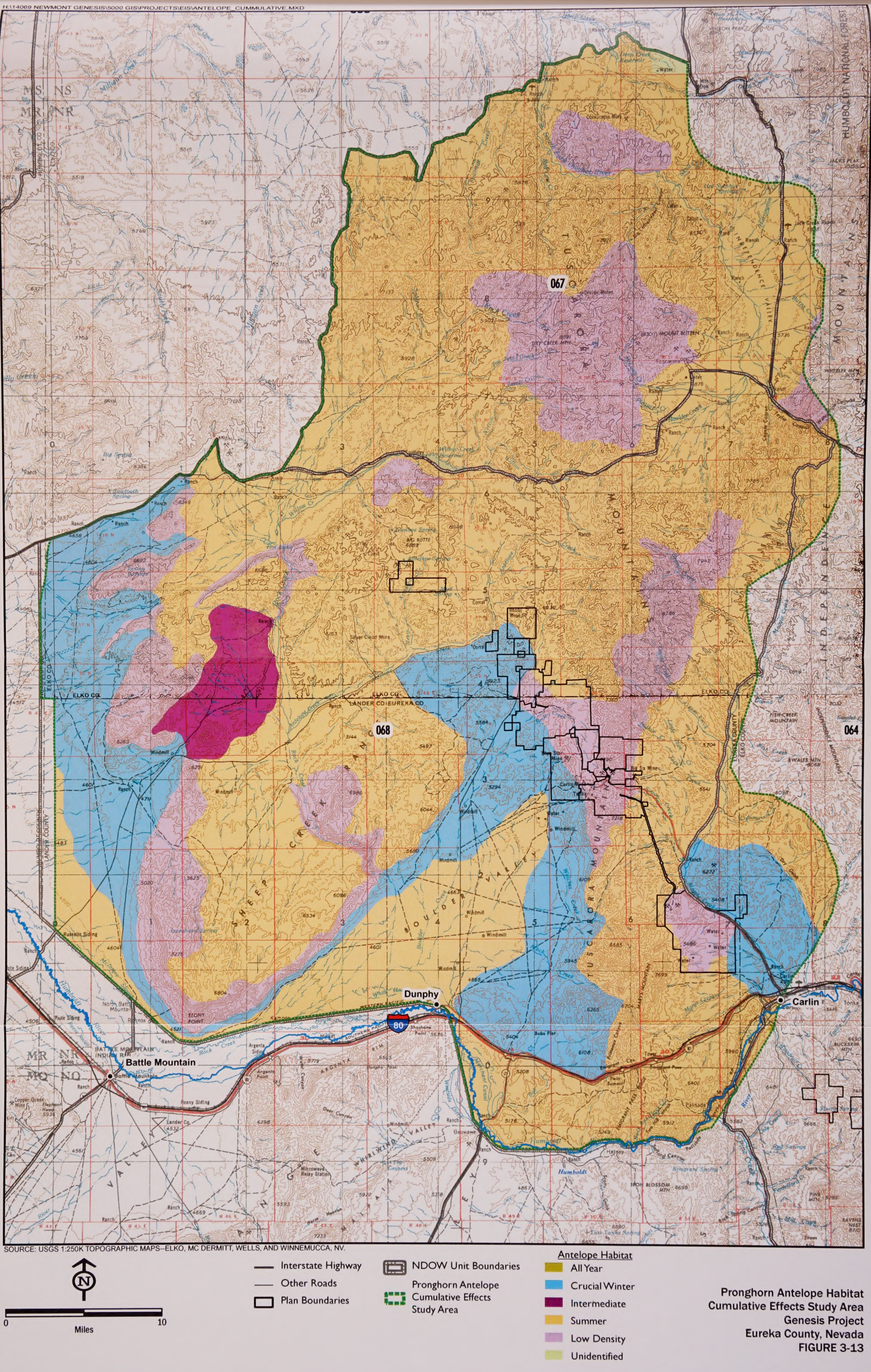
To date, mining and exploration operations in the CESAs have resulted in approximately 33,500 acres of surface disturbance of which approximately 1,920 acres have been reclaimed. Approximately 7,200 acres of additional disturbance are expected to occur from 2010 to 2021 in the Carlin Trend (see **Table 3-1**). About 52,000 acres of habitat lies within Plan boundaries for the various mine operations and exploration projects as shown on **Figure 3-1**. Actual disturbance (mining and exploration) since initiation of mining operations in the Carlin Trend within the Plan boundaries is approximately 33,500 acres. The difference (18,500 acres) between the Plan boundaries (52,000 acres) and actual disturbance (33,500 acres) encompasses undisturbed land that may or may not be accessible to wildlife. Some mine components such as heap leach facilities, tailing storage facilities, and mill sites are fenced to preclude access by wildlife. Not all Plan boundaries are fenced at the present time (exploration Plan boundaries and the Bootstrap project site, for example) so wildlife continues to have access to these areas (BLM 2010).

Development of large-scale mining operations along the Carlin Trend has resulted in increased habitat fragmentation and an overall reduction of suitable migration routes for big game between their seasonal ranges (BLM 2008a). Habitat fragmentation occurs primarily from direct disturbance or alteration of wildlife habitat. Other fragmentation effects such as increased noise, elevated human presence, dispersal of noxious and invasive weed species, and dust deposition from unpaved road traffic extend beyond the boundaries of direct habitat disturbance. These effects result in overall changes in habitat quality, habitat loss, increased animal displacement, reductions in local wildlife populations, and changes in species composition. The severity of these effects on terrestrial wildlife depends on factors such as sensitivity of the species, seasonal use, type and timing of project activities, and physical parameters (e.g., topography, cover, forage, and climate).

Removal of approximately 3.0Mcy of Tertiary Carlin Formation material from the East Lantern Waste Rock Disposal Facility for use as growth media for the Genesis Project would affect less than one percent of the disturbance footprint of the East Lantern Waste Rock Disposal Facility. The East Lantern Waste Rock Disposal Facility contains approximately 85Mcy of material and removal of 3.0Mcy would have no effect on aiding deer migration in the area.

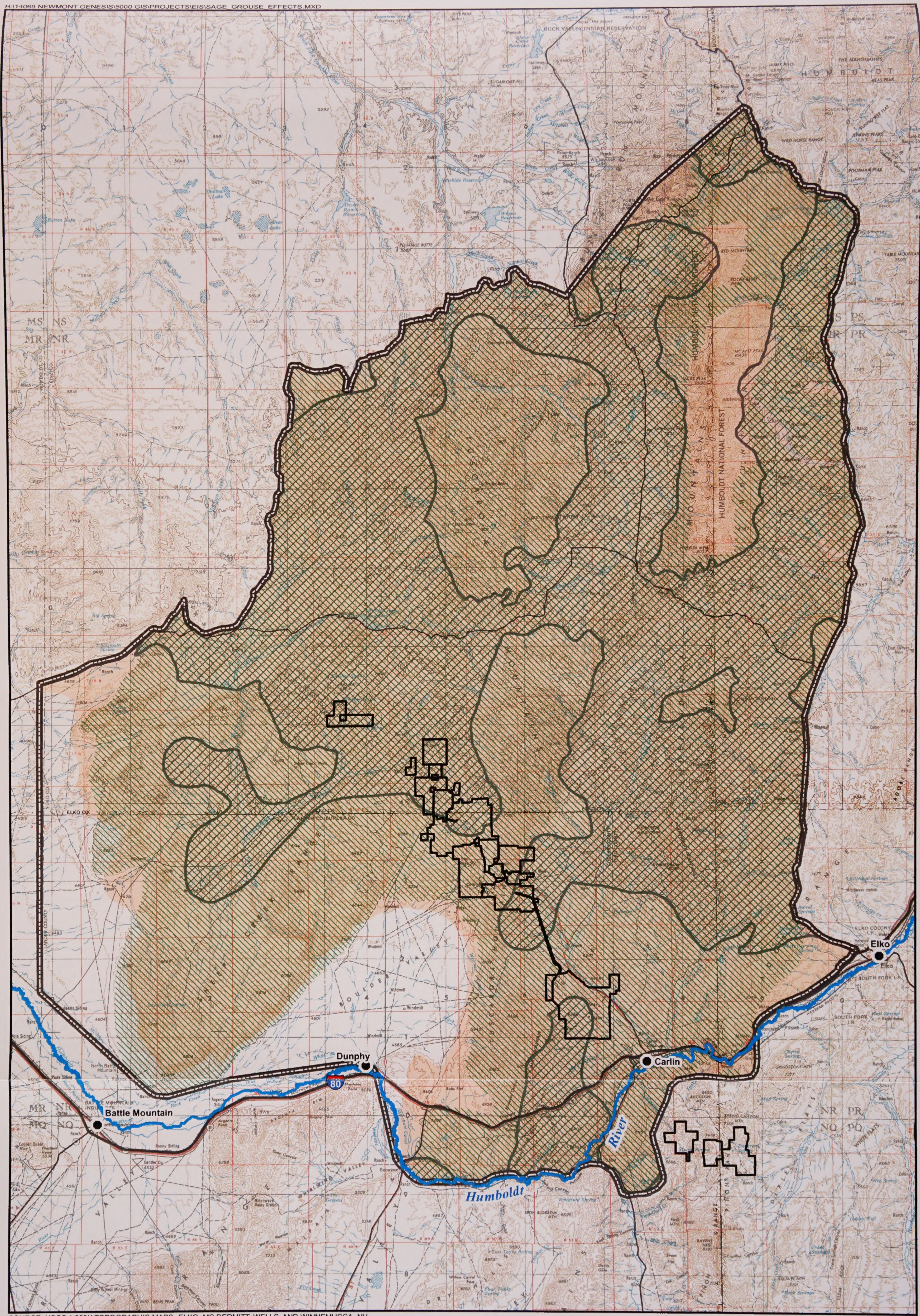


Mule Deer Habitat Cumulative Effects Study Area
Genesis Project
Eureka County, Nevada
FIGURE 3-12



Pronghorn Antelope Habitat
Cumulative Effects Study Area
Genesis Project
Eureka County, Nevada
FIGURE 3-13

H:\14069 NEWMONT GENESIS\5000 GIS\PROJECTS\EIS\SAGE_GROUSE_EFFECTS.MXD



SOURCE: USGS 1:250K TOPOGRAPHIC MAPS--ELKO, MC DERMITT, WELLS, AND WINNEMUCCA, NV.

N

0 Miles 15

Interstate Highway
Other Roads
Plan Boundaries
Cumulative Effects Study Area

Sage Grouse Habitat
Winter Habitat
Nesting and Early Brood Habitat
Late Summer Habitat

Sage Grouse Habitat
Cumulative Effects Study Area
Genesis Project
Eureka County, Nevada
FIGURE 3-14

From 1999 through 2007 approximately 1.1 million acres of wildlife habitat have been affected by wildfire in the CESAs. Wildfire has resulted in the temporary to long-term loss of shrubs that provide forage and cover as habitat components, which has caused reductions in mule deer and pronghorn herds throughout their respective CESAs. Effects of wildfires to terrestrial wildlife species include loss of habitat (forage and cover) which can lead to die-offs of mule deer and pronghorn as well as other species. The loss of canopy cover and forb and grass diversity is prevalent across the burned areas and the recovery of these plant communities will vary in terms of time and cover. In many areas, native shrub communities have been replaced by cheatgrass dominated grasslands (BLM 2007a, 2007b).

Approximately 383,000 acres have been seeded or managed for natural revegetation in burned areas (BLM 2007a, 2007b). Canopy cover in some areas has been reduced. Forb and grass diversity has also been reduced and recovery of these habitat types will vary in terms of time and cover across the burned areas.

Past, present, and reasonably foreseeable future actions in the CESAs have resulted, or would result, in the direct disturbance of habitat. Future underground mining, if it should occur, likely would not result in additional habitat disturbance. A portion of the cumulative disturbance areas have been, or would be, reclaimed or has recovered materially (i.e., wildfire areas). The reclaimed areas, and areas associated with habitat conversion, would be capable of supporting wildlife use; however, species composition and densities would change.

Big Game

Cumulative impacts to terrestrial wildlife would be directly related to habitat loss, habitat fragmentation, and animal displacement. Big game, especially mule deer, would be most susceptible to these cumulative impacts since encroaching human activities along the foothills of the Tuscarora Range and the Carlin Trend have resulted in animal displacement and habitat fragmentation in areas that are used as migration corridors between summer and winter ranges.

Mule Deer and Pronghorn Antelope

Historically, mule deer migrated south along both flanks of the Tuscarora Mountains to their winter range in the lower elevations of Boulder Valley (BLM 2008a). Migration corridors are specific areas within transitional ranges which are based on, but not limited to factors such as vegetation type, topography, and elevation. While the overall percentage of affected habitat is small, maintaining mule deer migration corridors around and between the various existing and foreseeable mining projects is an issue of concern (BLM 2007a, 2007b).

Development of mining projects in the CESA has caused mule deer migration to shift movement to the east side of the Tuscarora Mountains and along a northeast to southwest route adjacent to the Betze Pit (BLM 2002, 2008a). Proposed expansion of the Betze Pit (construction of the Clydesdale Waste Rock Disposal Facility) would disrupt this northeast to southwest migration corridor. Most deer migrating from the northern summer range to the winter range in the Dunphy Hills move through two areas: the Pete Project migration corridor and the Lantern migration corridor (Gray 2009).

Mining actions have impacted historic migration corridors in the southern portion of the Tuscarora Mountains, resulting in the loss of most of the migration routes on the west side of the Tuscarora Mountains and the concentrated use of remaining migration routes (Gray 2009). Mining activity has effectively reduced an historic ten-mile wide area on the Tuscarora Mountains which provided mule deer transitional range for migration to less than a one-mile wide area near the Pete and Lantern project areas.

The southeast portion of the Genesis-Bluestar Operations Area remains highly susceptible to fragmentation and is considered by NDOW to be a vital migration corridor for big game (Miller 2009b). With the reduction in the quantity and quality of the mule deer transitional range, mule deer currently tend to move through this habitat more rapidly, therefore, onto winter range earlier in the season (BLM 2007a, 2007b). With decreased availability and use of the transitional range in the CESA, increased demand is placed on forage on winter range areas. Encumbrances to mule deer movements include mineral exploration, active mining operations, livestock control fences, the North-South Haul Road, and vehicular traffic to mine areas along State Route 766 (Simon Creek Road).

NDOW, with support from Newmont and Barrick, has begun to collect monitoring data using radio collars to identify migration routes of mule deer in this area. One radio-collared mule deer doe migrated through the area in 2006 (BLM 2007a, 2007b). In 2007, two radio-collared deer wintered in the Dunphy Hills and migrated north through Sheep Creek passing between Leeville and the 4-2 Tailing Storage Facility and continued north into the Tuscarora Mountains. A third radio-collared deer wintered in Maggie Creek, north of Gold Quarry, and then migrated up Maggie Creek into a two-year old burn area. One radio-collared deer passed through the Pete Project area during spring 2007 (Pettit 2008).

Numbers of migrating mule deer are not well known because the herd has declined from 30,000 to about 8,000 animals due to effects of fire on winter ranges and the mild winter of 2006 which caused few mule deer to migrate (BLM 2007a, 2007b). An emergency antlerless deer hunt was conducted in Area 6 during the 2006 hunting season. The purpose of this hunt was to reduce the deer population in response to the loss of crucial habitat destroyed by fires during the summer of 2006. A total of 1,116 permits were issued for this hunt and hunters harvested 646 animals (Lamp 2007).

Displacement of mule deer and pronghorn by wildfire, mining activities, and other land uses increases demands on adjacent habitats. Most habitats are at carrying capacities and can not support additional animals (BLM 2007a, 2007b). Displaced animals would be lost from the population until habitats are rehabilitated, restored, or mitigated, allowing population to expand into affected areas.

Pronghorn habitat in Wildlife Management Units 067 and 068, located in Western Elko and Northern Lander and Eureka counties, experienced range fires of over 500,000 acres during the summer of 2006 (NDOW 2007). The Area 6 antelope herd was approximately 1,200 animals, but following the 2006 summer wildfires, NDOW (2007) estimates that Area 6 can support 700 to 800 antelope.

Tables 3-8 and **3-9** show the number of acres and percent of habitat that have been impacted by mining and wildfire in the mule deer and pronghorn CESAs.

TABLE 3-8 Effects of Mining and Wildfire on Mule Deer and Pronghorn Habitat			
Habitat	**Area (acres)**	**Area Included in Plan Boundaries (acres)**	**Area Effected by Fire (acres)**
Mule Deer			
Crucial Winter	386,589	1,097	267,057
Transitional	544,078	11,030	295,201
Low Density Use	1,061,856	39,739	415,338
Summer	994,862	187	191,633
TOTAL	2,987,385	52,053	1,169,229[1]
% of Total		1.7	39
Pronghorn			
All Year	106	0	106
Crucial Winter	254,339	11,785	115,736
Transitional	29,402	0	15,207
Low Density	247,344	28,988	109,473
Summer	1,059,524	11,280	508,942
Unidentified	2,556	0	1,287
TOTAL	1,593,271	52,053	750,7511
% of Total		3.3	47

[1] Includes Study Area for Terrestrial Wildlife and Special Status Species

TABLE 3-9 Percent of Mule Deer and Pronghorn Habitat Affected by Mining and Wildfire				
Habitat	**Mule Deer**		**Pronghorn**	
	Mining	**Fire**	**Mining**	**Fire**
All Year	---	---	0.0	100
Crucial Winter	0.3	69.1	4.6	45.5
Transitional	2.0	54.3	0.0	51.7
Low Density	3.7	39.1	11.7	44.3
Summer	0.02	19.3	1.1	48.0
Unidentified	---	---	0	50.4

Elk

Extensive fires have converted many shrub-dominated communities to grass-dominated communities. Elk, being primarily grazers, have benefited from increased grass production following fires; however, a multiple shrub component is needed for cover and forage diversity on a year-long basis. Reclaimed areas

on mine sites provide forage for elk because reclamation seed mixes have a large grass component, especially in early stages of reclamation. Mine perimeter fences may preclude use by elk until they are removed (BLM 2007a, 2007b).

Small Game, Nongame, and Migratory Bird Species

Cumulative effects on small game and nongame species have resulted primarily from wildfires, mineral exploration, mining activities, non-native invasive weed species, livestock grazing, drought, urbanization, and seeding of native range with introduced herbaceous species. Impacts to these species from these activities include loss of habitat, habitat fragmentation, and animal displacement.

Nesting raptor species also would be susceptible to these cumulative impacts since encroaching human activities along the foothills of the Tuscarora Range and the Carlin Trend have resulted in bird displacement and habitat fragmentation in areas that may be at their relative carrying capacity for these resident species. Many of the local wildlife populations (e.g., small game, migratory birds) that occur in the general wildlife CESA (**Figure 3-8**) would continue to occupy their respective ranges and breed successfully, although population numbers may decrease relative to the amount of cumulative habitat loss and disturbance from incremental development.

Special Status Species

The CESA for special-status species is the same as that for general wildlife (**Figure 3-8**) except for greater sage-grouse which is presented in **Figure 3-14**. The CESA for greater sage-grouse encompasses areas that are used by greater sage-grouse in relation to past, present, and reasonably foreseeable future actions.

Fires have negatively impacted sagebrush-associated species habitat in the short- to mid-term (5 to 15 years), due to loss of sagebrush canopy cover and vertical structure for nesting and cover. Diversity of forb and grass communities on cheatgrass dominated areas remains limited which also negatively impacts sagebrush obligates and associated species. Conversion of extensive areas of shrub steppe in the CESA by fire to large expanses of burned area, dominated by exotic grass species, has reduced the prey base and nesting habitat for numerous sagebrush associated species. **Table 3-10** shows the acreage and percent of greater sage-grouse habitat affected by mining and wildfire.

TABLE 3-10
Acreage and Percent of Sage Grouse Habitats Affected by Mining and Wildfire

Habitat Type	Study Area Acres	Mining (%)	Wildfire (%)
All Sage Grouse[1]	2,090,035	32,689 (1.5%)	996,234 (47.6%)
Nesting/Brood Rearing	1,065,587	24,397 (22.9%)	455,725 (42.7%)

[1] Includes winter, nesting and early brood rearing, and late summer habitats.

Several thousand acres of cultivated alfalfa in Boulder Valley and the Humboldt River Valley (area north of Battle Mountain) may potentially provide late summer/brood rearing habitat for greater sage grouse (BLM 2008a). These areas provide succulent forbs sought by grouse including alfalfa and other annual or

perennial forbs. The current extent of potential use of these cultivated areas by greater sage-grouse is unknown since cover provided by sagebrush habitats adjacent to these fields have been impacted by wildfires in many areas over the last 20 to 30 years (BLM 2008a).

The Ruby Pipeline Project would be constructed within a 115-foot wide construction corridor. Approximately 14 acres of sagebrush habitat would be disturbed per mile of pipeline construction. The pipeline would extend across about 60 miles of sage grouse habitat disturbing approximately 850 acres of winter and nesting/early brood rearing habitat. The additive effect of pipeline construction with other ongoing mining operations would continue a trend toward a reduction in sagebrush habitat/community types.

Impacts to sagebrush dominated community types would be long-term due to the time required to reestablish the vegetation characteristics of these community types. The arid environment in this region is not conducive to plant growth, and regeneration of vegetation following construction would be slow. Cumulative effects to other special status species would be similar to those discussed above for Small Game and Nongame Species.

3.4.6.4 POTENTIAL MITIGATION AND MONITORING MEASURES

- If occupied migratory bird nests are identified during avian surveys, locations will be reported to BLM and NDOW representatives and a suitable buffer will be determined depending on species. Residual effects: There will be no expected residual effects to the resource addressed by this mitigation.

- Strategically placed gaps in the berms adjacent to the haul roads to benefit animal movement. Gaps to be determined in cooperation with Newmont. Residual effect: This mitigation will reduce animal mortality, but would not eliminate it.

- Annually, Newmont will prepare a written report and will meet with BLM and NDOW to discuss deer migration issues in accordance with the to-be-completed Carlin Trend Herd Management Plan. Residual effects: Impacts to mule deer migration will continue.

3.4.7 SOCIAL AND ECONOMIC RESOURCES

3.4.7.1 AFFECTED ENVIRONMENT

The socioeconomic Study Area includes that portion of Elko County encompassing Elko, Spring Creek, Carlin, and adjacent unincorporated communities, hereafter referred to as the Elko Micropolitan Study Area (Elko MSA). Although the proposed Project is situated within Eureka County, the majority of employees and their families live in the Elko MSA, rather than Eureka County, due to long commuting distances between the Project and communities within Eureka County. Because there would be minimal direct impact to social life and community services in Eureka County, those resources are not discussed in detail in this EIS, but it is noted that changes in tax revenues could impact the funding for those resources depending on decisions made by local government. This section incorporates by reference the SOAPA and Leeville Project Draft Supplemental EISs (BLM 2007a, 2007b), the Betze Pit Expansion Draft

Supplemental Environmental Impact Statement (BLM 2008a), and relevant information from the Cortez Hill Expansion Project EIS (BLM 2008c) and the Bald Mountain Mine North Area Operations Project EIS (BLM 2008d).

Population and Demography

The population of Nevada has grown almost 25 percent over the last decade, and has been one of the fastest growing states (U.S. Bureau of the Census 2004). Population characteristics of northeast Nevada are shown in **Table 3-11**.

TABLE 3-11
Population Characteristics of Northeast Nevada
Genesis Project

Area	1990	2000	2006	Annual % Change 1990-2000	Annual % Change 2000-2006
Elko City	14,736	16,708	18,183	1.3	1.5
Spring Creek CDP[1]	5,866	10,548	14,000[2]	6.0	5.5
Carlin	2,220	2,161	2,281	(0.3)	0.9
Elko County	33,530	45,291	47,114	3.1	0.7
Eureka County	1,550	1,651	1,480	0.6	(1.1)
State of Nevada	1,201,833	1,998,257	2,623,050	5.2	4.6

[1] CDP = Census Designated Place

[2] Estimate by Elko County Planning and Zoning Director 2006

Source: U.S. Bureau of the Census 2001; Nevada State Demographer's Office 2008.

Spring Creek Valley, designated as a Census Designated Place (CDP), has steadily increased population since 1990, nearly doubling in size by 2000. Comparison of the 2000 population estimate of 10,548 and the Elko County Zoning Director's estimated population of 14,000 residents in 2006 represents a 32 percent increase. The U.S. Bureau of the Census does not estimate population during non-census years for CDPs, but subdivision growth in the area indicates increasing population.

Elko and Eureka counties are less ethnically and racially diverse than the State as a whole (**Table 3-12**). In 2005, Eureka County was over 83 percent white non-Latino, compared with nearly 71 percent for Elko County and 60 percent for Nevada. Elko County had less than one percent blacks, but nearly 22 percent Latino, compared with over 23 percent Latino for the State. Elko County also had a higher percentage of American Indian, Eskimo, or Aleut population with 5.6 percent compared with 1.4 percent for Nevada (Nevada State Demographer 2008). This is largely attributable to the presence of the Elko Band Colony, one of four colonies that comprise the Te-Moak Tribe of Western Shoshone Indians with headquarters in Elko.

TABLE 3-12 General Demographic Information Study Area Counties and the State of Nevada			
Characteristic	Elko County	Eureka County	State of Nevada
Total population (2006 estimate)	47,114	1,480	2,495,529
Percent Population change (April 1, 2000 to July 1, 2006)	4.0	-10.4	24.9
Percent White, not Latino (2005)	70.9	83.2	60.0
Percent Latino (2005)	21.7	12.7	23.5
Percent Black (2005)	0.9	0.4	7.7
Percent American Indian and Alaska Native persons, percent, 2005	5.6	1.0	1.4

Source: U.S. Census Bureau 2007.

Income, Employment, and Economy

Employment in Nevada is dominated by service industries (72 percent) and specifically the leisure and hospitality industries with 26 percent of the workforce in the sector. The gaming industry drives Nevada's economy. Gaming, hotel, and recreation areas employ the largest numbers of workers in the state (336,779). The next largest employment sector is trade, transportation, and utilities with 18 percent of the jobs statewide. Approximately one percent of jobs statewide were in the natural resource and mining industries (Nevada Department of Employment, Training, and Rehabilitation 2008). Employment by major industry with statewide employment by the same sector is shown in **Table 3-13**.

Mining has been and continues to be important to the economic well-being of Nevada. Nevada leads the nation in production of gold, silver, and barite. Mining provides the highest average salary of any industry in Nevada. Average annual earnings for workers in the gold mining industry in Elko and Eureka counties during 2007, was $79,500. By contrast, the average annual wage in Elko and Eureka counties for an employee in the Service sector was $35,828 in 2007 (**Table 3-14**).

Employment and expenditures in the mining industry have cascading effects (local, national, and international) on other employment and business activity. These effects were quantified through use of the IMPLAN® model cited by Ciciliano *et al.* (2008) for the Elko Micropolitan Statistical Area (Elko and Eureka counties). The model estimates creation of an additional 0.85 jobs for every direct mining job and $0.37 earned by those jobs for every $1.00 earned by mine workers. Direct effects of mining and the modeled estimates for additional employment, income, and economic activity resulting from the presence of the mining industry in Elko and Eureka counties (Elko Micropolitan Statistical Area) are shown in **Table 3-15**. Multiplier estimates vary by economic model and geographic location as well as industry. For example, the Cortez Hills Expansion Project Draft EIS (BLM 2008c) uses a multiplier of 1.2 for employment. The multiplier effect of 0.85 used for this analysis is considered conservative. The actual economic impact may be greater than estimated.

TABLE 3-13
Employment by Sector
Elko and Eureka Counties and the State of Nevada, 2007

Sector	Elko County		Eureka County		State of Nevada	
	Employees	Percent	Employees	Percent	Employees	Percent
Private Sector Industries						
Natural Resources and Mining	2,396	11.3	3,917	78.0	14,423	1.1
Construction	1,319	6.2	NA	NA	133,807	10.4
Manufacturing	216	1.0	NA	NA	50,119	3.9
Trade, Trans., Warehouse & Util.	3,739	17.6	100	2.0	231,714	18.0
Information	208	1.0	NA	NA	15,831	1.2
Financial Services	535	2.5	NA	NA	64,673	5.0
Prof. & Business Services	890	4.2	13	0.3	158,906	12.4
Educational & Health Services	1,225	5.8	NA	NA	92,011	7.2
Leisure & Hospitality	6,291	29.7	45	0.9	339,192	26.4
Other Services	597	2.8	8	0.2	29,169	2.3
Not Disclosed or Undetermined	10	0.0	742	16.7	1,512	0.1
Total Private	17,426	82.2	4,825	96.1	1,131,357	88.1
Government	3,782	17.8	197	3.9	152,894	11.9
Total All Industries	21,208	100.0	5,022	100.0	1,284,251	100.0

Source: Nevada Department of Employment, Training, and Rehabilitation 2008.
NA - Information not available
Note: Employment numbers are based on work location not place of residence.

TABLE 3-14
Income and Earnings Data
Elko and Eureka Counties, and State of Nevada

Characteristic	Elko County	Eureka County	State of Nevada
Average Annual Wages, All Industries, 2007	$37,960	$73,424	$42,172
Average Annual Wages, Other Services (except Public Admin.), 2007	$38,012	$33,644	$30,576
Average Annual Wages, Natural Resources & Mining, 2007	$76,492	$76,232	$75,088
Average Annual Wages, Metal Ore Mining, 2007	$82,628	$76,232	$80,184
Average Annual Wages, Gold Ore Mining, 2007	$82,732	$76,232	$80,600

Source: Nevada Department of Employment, Training, and Rehabilitation 2008 - Quarterly Employment and Wages.

TABLE 3-15
Economic, Employment, and Labor Income Impacts of the Hard Rock Mining Sector on the Elko Micropolitan Statistical Area Economy, 2007

Category of Impacts	Direct Effects[1]	Indirect[2] and Induced Effects[3]	Total Effects
Economic	$2,256,433,133	$681,372,997	$2,937,806,131
Employment	5,905	5,106	11,011
Labor Income	$537,516,769	$197,629,036	$735,145,806

Elko Micropolitan Statistical Area includes Elko and Eureka counties.
[1]Direct effects are those activities or expenditures associated directly with the Hard Rock Mining Sector.
[2]Indirect effects include those additional expenditures between economic sectors after the initial direct expenditure is made.
[3]Induced impacts or effects are the additional expenditures and economic activity attributable to household interactions.
Source: Ciciliano *et al.* 2008.

The economy of the Elko MSA is dominated by government and the mining industry. Employment numbers are based on work location not residence, which is why Eureka County has more employees in the natural resources and mining sector than it has residents (see **Table 3-13**). Several major mines, which impact the Elko MSA, are located in Eureka County including Barrick's Betze Pit operations and Newmont's North Operations Area, which includes the Genesis-Bluestar operations. In addition, the Cortez Mine in Lander County and the Bald Mountain Mine in White Pine County, both of which are closer to Elko than any community within their respective counties, contribute to employment and income in the Elko MSA.

Employees at these mining facilities do not necessarily live in the closest community to their place of employment or in the local governmental unit which receives tax revenues from those facilities. For example, more than 4,000 mine workers reside in the Elko MSA but are employed at mines outside Elko County. The following are the major, but not the only, operations located outside Elko County that employ Elko MSA residents:

- Bald Mountain Mine – White Pine County (179)
- Cortez – Lander County (673)
- Barrick Betze Pit – Eureka County (1,131)
- Newmont Carlin Operations – Eureka County (2,127)

At an average wage of $79,500, the income from these mine employees working outside Elko County is more than $320 million per year. Estimating 25,000 workers residing in Elko County (more than would be in the MSA) (21,208 from **Table 3-13** plus the 4,000 living in the Elko MSA), earning an average of $40,000 per year (compare with **Table 3-14**), total wages would be $1.0 billion per year, meaning that mining operations located outside Elko County provide more than 32 percent of Elko County wages.

Newmont employs approximately 1,300 persons for its Carlin Trend surface operations which include several mining and exploration projects. Among them are Gold Quarry, Pete Project, Genesis-Bluestar, and the proposed Emigrant Mine. Employees of the surface operations are moved from project to

project as needed, thus one project may be vacant for an extended period of time before another project winds down releasing personnel. Thus, Newmont gains some flexibility in producing cash flow, can adjust mining to feed particular ore types to processing facilities, and can maintain a stable work force which is critically important given the training and skills required for mining.

Newmont procures a variety of goods and services from local and state suppliers. In 2006, Newmont spent approximately $900,000 for supplies purchased in Nevada and approximately $151 million for contract labor. The company averaged 600 contract laborers for the year although the number varies seasonally (Pettit 2007).

Housing

In 2000, there were 18,456 housing units in Elko County; 85 percent were occupied, and 15 percent were vacant (U.S. Bureau of the Census 2000). Of the occupied housing units, 70 percent were owner-occupied and 30 percent renter-occupied. In 2005 estimates for Elko County included 19,066 housing units, of which 70 percent were owner-occupied (U.S. Bureau of the Census 2007). The median value of owner-occupied housing units was $123,100 (U.S. Bureau of the Census 2007).

Following a review of the Spring Creek Lamoille Master Plan in 2006, the Elko County Planning and Zoning Director estimated approximately 14,000 people lived in this area. The Plan estimates that potential population in this area could reach between 35,000 - 40,000 people based on the number of parcels ranging in size from 2½ to 10 acres. In March of 2006, the County Zoning Director indicated that the Spring Creek Subdivision contained 6,400 lots, of which 4,480 (70 percent) have already been developed. Another 1,920 lots remain to be developed in the 120 square mile development area (Elko County Planning Commission 2006).

Community Facilities and Services

Water Supply

Elko City water is provided from 18 deep-water wells. Water is stored in ten tanks with a total capacity of 25 million gallons. The system has a maximum production capacity of 14.5 million gallons per day (mgd) with current usage ranging from 3 mgd to a peak of 13 mgd. Spring Creek residents are served by nine public wells. A deep well and natural springs provide Carlin with water. Water is stored in a 2-million-gallon tank. Peak production capacity is 980 gpm, or approximately 1.4 mgd, averaging 450 gpm. Residents in outlying areas depend on private wells for domestic water supply.

Wastewater Treatment Facilities

Both Elko and Carlin have wastewater treatment facilities. Elko has a "fixed film" biological treatment plant averaging 3.5 mgd. Approximately 60 percent of treated water is reused for irrigation. Carlin uses two lagoons with rapid infiltration basins. Many Spring Valley subdivision residents use individual septic systems.

Solid Waste

The regional landfill in the City of Elko is the only landfill in the county. The estimated life of the landfill, at 1,000 tons of solid waste per day, is approximately 94 years. Currently, the landfill is accepting approximately 110 tons of solid waste per day (NDEP 2004).

Energy

Sierra Pacific Power Company provides electrical service. Natural gas is provided by Southwest Gas Corporation.

Law Enforcement

The Nevada Highway Patrol, Elko County Sheriff's Department, Elko City Police, Carlin City Police, and Bureau of Indian Affairs Police provide law enforcement services to community residents. The Highway Patrol is responsible for law enforcement activities on state highway systems. The Sheriff's Department is accountable for Elko County including the unincorporated towns (17,135 square miles) and is aided in search and rescue operations and emergency situations by the Sheriff's Posse and Reserves. The Elko County Jail, operated by Elko County Sheriff's Department, is located in Elko (BLM 2008a). The Elko and Carlin City Police are restricted to enforcement within the city limits. The BIA Police is accountable for law enforcement on the Elko Band Colony.

Fire Protection

Fire protection in the cities of Elko and Carlin is provided by the Elko City Fire Department, Carlin City Volunteer Fire Department (a combined fire, ambulance, and rescue unit), BLM, USFS, and Northeastern Fire Protection Department of the Nevada Division of Forestry. The Elko and Carlin fire departments primarily serve residents within their city limits and the Elko Band Colony; however, both departments maintain mutual aid/cooperative agreements with other firefighting agencies in the area. The BLM is primarily responsible for fighting wildfires (BLM 2008a).

Ambulance Services

Ambulance services are available in Elko and Carlin for ground transportation of patients. Fixed-wing ambulance aircraft and a helicopter are also available at the Elko Airport and Northeastern Nevada Regional Hospital, respectively.

Health Care

The Northeastern Nevada Regional Hospital opened in September 2001. The hospital is situated on a 50-acre campus in the City of Elko. Services at the hospital include 24-hour emergency care, physical therapy, full-service laboratory, intensive care unit, pediatric unit, inpatient pharmacy, obstetrics and gynecology, 24-hour radiology, MRI and CAT Scan, nuclear medicine, mammography, ultrasound, chemotherapy, neurology, sleep medicine program, inpatient and outpatient surgery, cardio-pulmonary therapy, pulmonary function testing, stress treadmill testing, and nutrition counseling (Northeastern Nevada Regional Hospital 2009).

The hospital, under contract with the Indian Health Service (IHS), also provides medical care and emergency services to Native Americans. In addition, comprehensive medical care through IHS is provided at the Elko Band Colony by the Health Center which opened in July 1992. The Center houses a pharmacy, dental rooms with a laboratory, and other support services.

Education

The Elko County School District operates 13 schools in the socioeconomic Study Area. Seven elementary schools provide education to students enrolled in kindergarten through grade 5 or 6 depending on location. Flagview Intermediate School serves grades 5 and 6 in Elko; Adobe Middle School serves grades 7 and 8 in Elko; Spring Creek Middle School serve grades 6 through 8; while Elko and Spring Creek High Schools serve grades 9 through 12. The Carlin Combined School provides education to students in kindergarten through grade 12.

Education of children in kindergarten through grade 12 from the Elko Band Colony is provided through the Elko County School District via the local school system. A Head Start Program is housed and operated at the Colony for children aged 3 through 5. Under contract with the Bureau of Indian Affairs, the Elko Band Council provides higher education and an adult vocational program at the Colony.

Great Basin College offers 4-year baccalaureate degrees in agricultural management, Digital Information Technology, Instrumentation, Land Surveying/Geomatics, and Management in Technology; Nursing and Social Work; Post baccalaureate teacher certificates in elementary and secondary education; and a wide variety of Associate degrees and Certificate Programs.

Public Assistance

Public assistance in Elko County is provided by Elko County Social Services and the Nevada State Welfare Department. Other smaller organizations provide temporary assistance to residents suffering hardships. The Elko Band Council, under contract with the BIA, provide eligible Native Americans with general welfare assistance, adult institutional care, Indian child welfare (including foster care and institutional placements), indigent burial assistance, counseling services, and assistance with Social Security, disability, and death benefits, and state Medicare and Medicaid benefits (BLM 2008a).

Public Finance

Elko County is governed by a five member elected Board of Commissioners. Both the City of Elko and Carlin have city councils and city managers. County residents also elect the trustees of the Elko County School District. Residents in the Spring Valley Association elect a Board of Directors to manage the area.

Taxes paid by mining operations are a primary source of revenue for the State of Nevada, counties, and local governments. Based on information from the Nevada Department of Taxation and industry surveys, estimated state and local taxes paid by the mining industry in 2007 increased by almost 3.7 percent over 2006. This increase follows a 45 percent increase in estimated taxes paid in 2006 over 2005, which represents the highest estimate over the past two decades. Total estimated taxes paid by

mining companies in the state of Nevada in 2007 were $199.5 million, up from $194.2 million in 2006. These figures include only taxes paid by mining companies and does not include taxes paid by industry employees or suppliers (Dobra 2007).

Tax categories paid by mining companies include: employment taxes, Net Proceeds of Minerals (NPM) taxes, sales and use taxes on purchases, and property taxes. NPM taxes are paid to the county where the ore is mined, not the county where employees live. For example, NPM taxes are generated in Eureka County by the major mines of the Carlin Trend, including the Betze/Post, Gold Quarry, Leeville, and Genesis-Bluestar operations, but most employees live in Elko County. Companies pay property taxes based on the location of the property and sales taxes at the point of purchase. Since most companies providing services to the mines are located in Elko County and the majority of mining employee's lives and purchase products and services in Elko County, the county receive substantial mining related tax revenue.

Net proceeds taxes distributed to Elko and Eureka counties are shown in **Table 3-16**. Mining activity has increased in Eureka County and decreased in Elko County over the time period. Future distributions will depend on continued mining and discoveries of new ore deposits.

TABLE 3-16
Net Proceeds Tax Distributed to Elko and Eureka Counties

Fiscal Year	Elko	Eureka	State of Nevada/Total County Distribution
1999-2000	$3,189,780	$1,911,738	$14,525,017
2000-2001	2,891,062	2,968,354	14,114,324
2001-2002	1,264,908	1,278,428	11,425.034
2002-2003	1,561,131	1,222,059	13,756,888
2004	2,049,505	3,331,918	19,093,251
2005	2,003,547	3,356,887	21,886,103
2006	2,044,142	5,272,665	23,357,518
2007	2,489,641	8,089,017	32,345,089
2008	1,207,086	9,946,215	36,624,590

Source: Nevada Department of Taxation 2008.

In 2007, Newmont paid $4.8 million in net proceeds taxes to Eureka County and $367,000 to Elko County. Sales and use taxes paid by Newmont in 2007 include $14.5 million to Eureka County and $6.2 million to Elko County. Newmont paid $172,000 in property taxes to Elko County and $4.2 million in property taxes to Eureka County (Newmont 2008c). In the period from 2006-2007, these payments represent 0.5 percent of Elko County's total property tax revenue ($29.8 million) and 34 percent of Eureka County's total property tax revenue ($12.3 million). Total taxes paid by Newmont in 2007 to Elko and Eureka counties were $30.2 million.

Social Conditions

The socioeconomic character and cultural diversity of Elko County and surrounding northeastern Nevada reflects a history of occupations and nomadic use by Native Americans followed by the construction of the trans-continental railroad (completed in 1869) and an influx of explorers and settlers. An important change in the Elko economy came with Nevada's legalization of casino gambling in 1931. Gaming and entertainment in Elko County casinos are highly visible social and economic institutions.

Mining has been a source of income in Elko County since the 1850s. Mining and related development in the 1980s and 1990s caused rapid population growth in the cities of Elko and Carlin and was a dominant force in shaping the socioeconomic character of the area. The population increase resulted in expanded economic activity, new neighborhoods, increased traffic, increased use of parks and other public facilities, higher incomes, lower unemployment rates, and increased business opportunities.

With more than 47,000 residents, Elko County, located in the northeastern corner of Nevada, contains the cities of Carlin, Elko, Wells, and West Wendover, as well as the unincorporated communities of Spring Creek, Jackpot, Montello, and Mountain City. The Elko MSA has a sense of community, a four-season climate, a moderate cost of living, 120 acres of public parks, education and health care facilities, and for the last 30 plus years economic growth which has waxed and waned with the fortunes of the mining companies.

Elko, along with the adjacent community of Spring Creek, is the center of commerce and government in northeastern Nevada. The town serves as the county seat for Elko County, the fourth largest county (by area) in the continental U.S. (BLM 2008a).

Carlin is the gateway to the Carlin Trend, the most productive gold mining district in the western hemisphere. Mining became a significant employer in the early 1960s. The Carlin Trend has two of the largest open pit gold mines in the world, Newmont's Gold Quarry Mine and Barrick's Betze/Post Mine.

The Elko Band Colony of the of the Te-Moak Tribe of Western Shoshone is also located in Elko County in the high desert of northeastern Nevada, near the Humboldt River. The reservation encompasses 192.80 noncontiguous acres adjacent to the City of Elko. The Elko Colony was established by Executive Order on March 25, 1918, which reserved 160 acres for Shoshone and Paiute Indians living near the town of Elko. Today, 192.8 acres are in federal trust.

3.4.7.2 DIRECT AND INDIRECT IMPACTS

Proposed Action

Population and Demography

Implementation of the Genesis Project would extend existing employment for twelve years which would tend to maintain current population levels during that twelve-year period. Following completion of the Genesis Project, if no other employment were available, the local population would begin to decrease as laid-off employees leave the area to seek employment and as retirees relocate.

Income, Employment, and Economy

As indicated previously, Newmont currently employs about 1,300 workers at surface operations in the Carlin Trend, including Genesis-Bluestar (Newmont 2009d). Approval of the Genesis Project would task about 200 of these employees to the Genesis Project during initial operations increasing to over 1,100 in year seven of operations with slight decreases annually until the beginning of closure in year twelve (Newmont 2009d). The average employment figure would be about 687 (Newmont 2009d). Because of the way Newmont manages its work force, it is unlikely that all these employees would work at Genesis for twelve years. Rather, Newmont would continue to move people from project to project such that 550 people may be employed at Genesis from 2012 to 2016 while 450 others are moved to the proposed Emigrant Mine until Emigrant is completed, then those 450 employees would return to Genesis, allowing Newmont to maintain the overall Carlin Trend work force at steady levels. Regardless of how the Project is managed, including an extended mine life if personnel are shifted elsewhere during the mine life, the Genesis Project represents more than 9,000 man years of employment. At the end of active mining, a relatively small number of employees would be tasked to complete final reclamation and closure of the Project.

Based on the average annual salary ($79,500) the proposed Project would continue employment producing an average of more than $54 million in annual wages for the area over the lifetime of the Project. Each mine employee would generate an additional 0.85 indirect or induced job in the Elko/Eureka counties economy (Price and Harris 2007). Each $1.00 of direct labor income from the hard rock mining industry generates an additional $0.37 of indirect/induced labor income (Price and Harris 2007). Based on these multipliers, the proposed Project would support continuation of about 584 secondary jobs in Elko and Eureka counties' economy during the twelve years of operation, providing an additional $23 million of indirect and induced wages annually. Thus direct and indirect employment provided by the Genesis Project would average 1,271 jobs and $77 million in annual wages, representing more than five percent of all jobs in Elko County (see **Table 3-13**) and more than ten percent of the labor income for the Hard Rock Mining Sector (see **Table 3-15**), in Elko and Eureka counties. At the end of the Genesis Project, if no replacement employment is available, the remaining jobs associated with the Genesis Project will be lost. This effect is similar and perhaps identical to the No Action Alternative, but the additional twelve years of employment would allow additional time for new industry to develop in the Elko MSA and perhaps provide alternative employment when mining winds down.

Housing

With no change in permanent employment or population, there would be no substantive change in the demand for permanent housing as a result of the Proposed Action. However, it is noted that with the national increase in unemployment, significant numbers have moved to Elko hoping for employment at the mines, swelling the demand for housing (and producing a higher unemployment rate) even though there has been no concurrent increase or decrease in total employment. If the national economic situation of high or worsening unemployment continues, housing in Elko could see increasing demand simply because the local economy, with its high paying mining jobs and relatively strong economy would continue to attract those from areas where the economy is not as prosperous. At the end of the Genesis Project, assuming no replacement employment, demand for housing would decrease sharply as laid-off workers seek employment elsewhere. This effect would be the same as for the No Action Alternative but delayed by twelve years.

Community Facilities and Services

The proposed Genesis Project would have no long-term effect on community facilities and service demands because Newmont's work force is already resident in the community. At the end of the Genesis Project, assuming no additional mining, the effects of closure of the mine would be approximately the same as the No Action Alternative, but delayed by twelve years.

Public Finance

The proposed Genesis Project would continue to provide tax revenues to the state and local governments for an additional twelve years. After twelve years, the revenue status would be very similar to that of the No Action Alternative. The amount of tax revenue depends on numerous unpredictable variables including the price of gold and the ability of the mining company to sustain production. Sales and property taxes paid by workers living in Elko County would continue to support local governments and businesses during the twelve-year life of the Project.

Social Conditions

Continuation of mining activity at the Genesis Project would sustain existing social conditions for approximately twelve years. The community generally considers existing social conditions to be positive, given the high pay for mining employees and the growing economy. After twelve years, if there is no replacement employment, social conditions would begin to decline as increased unemployment occurs, laid-off employees leave for other opportunities, and total community income decreases. This effect is similar to the No Action Alternative but would occur twelve years later.

No Action Alternative

Population and Demography

Under the No Action Alternative, mining in the Genesis Project area would continue to operate until 2010. Mining reclamation and closure would continue for an additional three to five years. Effects on population and demographics in the area are uncertain, since Newmont strives to reassign personnel on an operational need basis in order to maintain a trained work force. However, it seems likely that without approval of the Genesis Project, and with it, the prospect for continued employment for an average of 687 employees over twelve years, layoffs would likely begin at the end of mining in 2010, if Newmont was unable to re-direct its work force to other developments, such as the Emigrant Project. Laid-off workers, without prospective employment from other potential mining operations would likely leave the area, with their families, to seek employment elsewhere.

Income, Employment, and Economy

Layoffs would likely begin in 2010 although the number of layoffs would depend on Newmont's ability to shift employees to other projects and perhaps limit operations in the Genesis Project area to private land. Eventually, given that the Genesis Project is expected to provide 687 jobs for twelve years and if it were not feasible to carry on operations using only private land, a decision to not approve use of public land for the Genesis Project could result in the loss of up to 687 jobs and the wages, indirect employment, and tax revenue related to those jobs.

The Elko MSA labor force would not likely be able to absorb mine workers laid off due to decreased mining activity or mine closure due to the following:

- Fewer opportunities for employment in industries requiring skills similar to mining;
- Occupational skills required in the mining sector do not match-up well with those needed for the next highest employment sector (hotels/casinos) in the area.
- Skills demanded by the mining industry require more education than those in the hotel/casino industry;
- Wages in the next highest employment sector (hotels/casinos) are nearly $60,000 less per year than the average for mining;
- Occupational skills required for mining are not transferable; and
- Employment in linked sectors is likely at maximum levels and would experience a downturn commensurate with the decreases in mine sector employment (Ciciliano *et al.* 2008).

Impacts on employment and income in the Carlin Trend are dependent on timing of mine openings and expansions because job losses may be offset or at least mitigated by new projects, expansion to other mines requiring more workers; or employment with other companies. Closure of one project and the construction/operation of another project may not offset the loss in number of jobs and economic opportunities.

Housing

Effects on the local housing market from the No Action Alternative would depend on the capacity of the local economy to absorb workers into new jobs. As described above, alternative employment for 687 mining related jobs and 584 indirect jobs would seem to be highly unlikely. Since approximately 15 percent of the local work force could be affected, and would likely have to seek employment outside the area, the No Action Alternative would result in decreasing occupation rates in housing, rental rates, and home and property values.

Community Facilities and Services

The No Action Alternative would result in increased demands on social services such as unemployment compensation and counseling related to loss of employment. The decline in tax revenues associated with declining mining could stress community services due to an increasing need for services and decreasing funding. As laid-off employees depart the area, demand and need for community services would decline resulting in loss of service jobs, which are part of the secondary and indirect employment sectors. Effects would include decreasing enrollment in local schools as the families of laid-off workers depart the area.

Public Finance

The No Action Alternative would result in reduced tax revenue leading to cuts in funding for local government. Decreased revenue would most likely result in decreased public services and layoffs of public employees.

<u>Social Conditions</u>

The No Action Alternative could affect up to 687 families and, potentially, several hundred others from the secondary and indirect employment sectors, increasing stress on individuals and family members involved. Quality of life would be adversely affected for a period of time while unemployed, and longer if replacement jobs resulted in a lower standard of living.

3.4.7.3 CUMULATIVE EFFECTS

The CESA for social and economic resources includes Eureka County, the Cortez Mine and Cortez Hills Expansion projects in Crescent Valley (Lander County), Bald Mountain Mine (White Pine County), and the Elko MSA. The rationale for including the Cortez and Bald Mountain projects in the CESA is due to the fact that most employees at these facilities (76 percent Cortez Project and 64 percent Bald Mountain Mine Project) reside in Carlin, Elko, and Spring Creek (BLM 2008c, 2008d). Except for Cortez and the Bald Mountain Mine, past, present, and reasonably foreseeable future activities are described in Section 3.3. To the degree these activities have an important impact on the social and economic resources in the Elko MSA, they are presented in the following discussion.

Approval of the Betze Pit Expansion Project extended employment for 1,600 employees for four to five years at the Barrick Goldstrike operation. The approved Cortez Hills Expansion Project would increase employment by 450 persons during the 18 months of development (2009 and 2010) followed by a reduction to a long term increase of 350 employees for nine years over existing levels (BLM 2008c). Approximately 30 percent of the development work force would be non-local, living in the area temporarily during construction. The other 70 percent would be from the commuting area, of which approximately 76 percent would be expected to come from the Elko MSA (BLM 2008c). Thus the Elko MSA could expect an increase of approximately 240 long term employed residents during construction increasing to 266 when mining commences with that increase lasting for nine years. Employment for residents of the Elko MSA at various mine facilities in the Carlin Trend are shown in **Table 3-17**.

The Bald Mountain Mine North Operations Area Project, which is in the permitting process, would employ 50 people that reside in the Elko MSA for a period of approximately six years, if approved (BLM 2008d). No other major projects are underway or expected which would result in changes to employment levels in the Elko MSA during the time frame of the Genesis Project. Thus, total direct long-term mining employment would be expected to increase from 5,905 (see **Table 3-15**) in 2007 to 6,195 in 2010 and 6,221 from 2011 to 2015 decreasing after 2015 as operations at the Betze Pit and the Bald Mountain Mine begin to wind down, followed by reductions at Cortez about 2019 and then Genesis in about 2021. Ongoing exploration and changes in the price of gold may result in changes to the current forecasts for mining operations and employment. Economic activity, including tax revenues, housing, and school enrollment run parallel with the employment in the mining sector because of the dominance of the mining sector on the Elko MSA economy. An assumption of 25,000 employed residents in Elko County, in a population of about 47,000 is fairly reasonable. This takes the number of 21,208 (see **Table 3-13**) and adds the estimate of 4,000 to account for the employees who live in the Elko MSA but work in Eureka, Lander, and White Pine counties. About 11,000 jobs (see **Table 3-15**) are directly or indirectly related to the Hard Rock Mining Sector; approximately 42 percent of total employment in Elko and Eureka counties (see **Table 3-13**).

TABLE 3-17
Actual and Projected Employment for Residents of Elko MSA at Mine Facilities in Carlin Trend and TS Power Plant

Mine	Year of Operation																	
	2001		2007		2008		2009		2010		2011		2015		2020		2025	
	Total	Elko MSA	Total	Elko MSA	Total	Elko MSA	Total	Elko MSA	Total	Elko MSA	Total	Elko MSA	Total	Elko MSA	Total	Elko MSA	Total	Elko MSA
Newmont Carlin Trend (less Midas with Genesis)	1455[1]	1455[2]	1907[3]	1907[2]	2374[4]	2374[4]	2289[4]	2289[4]	2061[4]	2061[4]	2011[4]	2011[4]	1722[4]	1722[4]	788[4]	788[4]	71[4]	71[4]
Without Genesis Project[3]	NA		NA		NA		NA		1850	1850	1566	1566	632	632	0	0	0	0
Barrick Betze Pit	1127[1]	1082[2]	1131[3]	1082[2]	597[5]	573[5]	597[5]	573[5]	601[5]	577[5]	599[5]	575[5]	333[5]	320[5]	114[5]	109[5]	14[5]	13[5]
Barrick Meikle	607[1]	583[2]	919[3]	882[2]	526[5]	505[5]	526[5]	505[5]	548[5]	526[5]	603[5]	579[5]	450[5]	432[5]	0[5]	0[5]	0[5]	0[5]
Barrick Overhead & Processing[5]	IA	IA	IA	IA	549	527	549	527	336	323	329	316	289	277	218	207	162	155
Barrick Contractor Employees[5]	IA	IA	IA	IA	400	384	400	384	400	384	400	384	400	384	200	192	75	72
Barrick Cortez[6]	394	299	550	418	985	749	885	673	885	673	885	673	685	521	155	118	0	0
Newmont Midas	233[1]	0[1]	220[2]	0[2]	225[4]	0[4]	225[4]	0[4]	202[4]	0[4]	171[4]	0[4]	0[4]	0[4]	0[4]	0[4]	0[4]	0[4]
Rodeo Creek Gold	0	0	144[3]	10[7]	144[7]	10[7]	144[7]	10[7]	144[7]	10[7]	144[7]	10[7]	144[7]	10[7]	144[7]	10[7]	0[7]	0[7]
Barrick Bald Mountain[8]	107	68	196	125	205	131	285	179	295	186	325	208	260	166	25	16	1	0
Jerritt Canyon	411[1]	370[9]	357[2]	321[9]	400[9]	360[9]	30[9]	27[9]	150[9]	135[9]	Unk		Unk		Unk		Unk	
TS Power Plant	0	0	UC	UC			65[4]	46[4]	65[4]	46[4]	65[4]	46[4]	65[4]	46[4]	65[4]	46[4]	65[4]	46[4]
Totals with Genesis	NA		NA		NA		NA		5687	4921	5532	4802	4348	3878	1709	1486	388	357
Totals without Genesis	4334	3898	6324	5031	6405	5613	5995	5213	5476	4710	5087	4357	3258	2788	921	652	317	286
Net due to Genesis	NA		NA		NA		NA		211	211	445	445	1090	1090	788	788	71	71

[1] Nevada Division of Minerals 2001.
[2] BLM 2009a.
[3] Nevada Division of Minerals 2007.
[4] Newmont 2009d.
[5] BLM 2009b.
[6] BLM 2008c.
[7] BLM 2009c.
[8] BLM 2008d.
[9] USFS 2009.
NA = Not Applicable; IA = Included above; Unk = unknown; UC = under construction for 27 months with employment at a maximum of 900 workers – most from out of the area.
Elko MSA = encompasses Elko, Spring Creek, Carlin, and the adjacent unincorporated communities in Elko County, Nevada.

Proposed Action

The Proposed Action would continue existing employment levels helping to maintain a stable and healthy economy in the local area during the twelve-year Project life. Assuming no additional major projects coming on-line that would impact the Elko MSA economy, mining employment would begin to decrease in 2015 with the completion of the Betze Pit Expansion Project and diminished mining at the Bald Mountain Mine (perhaps a loss of 550 jobs in 2015) followed by completion of the Cortez Hills Expansion Project (approximately 200 jobs lost in 2015 and another 530 jobs lost in 2019 (BLM 2008c) with remaining jobs from the Genesis Project beginning to disappear in 2021.

Economic activity, direct and secondary employment, tax revenues, housing, and school enrollment in the Elko MSA are affected by the mining sector. Extension of mining activity does provide an opportunity for the Elko MSA to develop other economic activities that could replace mining.

No Action Alternative

The No Action Alternative could mean the loss of the average of 687 jobs that would be associated with the Genesis Project beginning in 2010 along with the additional 584 jobs indirectly supported by mining. This could be offset by employment opportunities at the Cortez Hills Expansion Project and expansion at the Bald Mountain Mine. A net loss of approximately 450 direct mining jobs and another 380 indirect jobs could occur during the time frame of the Genesis Project compared to the Proposed Action. Tax revenues, impacts to social services, housing and other economic impacts would parallel the decline in employment, which would be approximately seven percent of mining-related employment in Elko and Eureka counties. The No Action Alternative would result in a decrease in economic activity in the Elko MSA sooner than would be the case with the Proposed Action making it more difficult to develop possible economic replacements for mining.

3.4.7.4 POTENTIAL MITIGATION AND MONITORING MEASURES

No proposed mitigation or monitoring measures have been identified for social and economic resources.

3.5 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE HUMAN ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

3.5.1 Air Resources

Particulate matter would be generated during active mining and the initial stages of reclamation (i.e., replacing and distributing growth media). Newmont would control fugitive dust emissions in accordance with NRS 445B.230.6 and its Fugitive Dust Control Plan approved by NDEP Bureau of Air Pollution Control. The Plan outlines the use of water and/or other surface treatments such as chemical binders (mag-chloride), and interim and concurrent reclamation. Particulate and gaseous emissions in the Carlin Trend would be prolonged over the mine life but would have no effect on long-term productivity or exceed existing air quality standards. After cessation of mining and completion of reclamation activities, air quality would be expected to reach pre-mining conditions.

3.5.2 Geology and Minerals

Development of the Genesis Project would maximize recovery of ore deposits within existing disturbed areas and prolong economic benefits provided by the Project. Minimizing the amount of open pits remaining at the end of mining would reduce the area of new surface disturbance that would not likely be productive in the long-term. Long-term productivity for wildlife habitat and livestock grazing would be reduced by the amount of open pits remaining after mining ceases.

3.5.3 Water Quantity and Quality

Dewatering the east wall of the Genesis Pit would provide water for use on the North Area Leach Facility or other mine-related facilities over the twelve-year mine life. Short-term dewatering operations affecting compartmentalized groundwater east of the Gen Fault would have no effect on regional groundwater levels or on long-term productivity provided by surface and groundwater resources.

3.5.4 Soil Resources

Soil resources (growth media) would be excavated, direct hauled to areas that have been readied for reclamation, or stockpiled until needed for reclamation. Modification of chemical and physical properties, loss to wind and water erosion, and decreased biological activity would affect soil while being handled and/or stockpiled. A soil deficit would likely occur when reclaiming waste rock disposal facilities and backfilled mine pits which would have a greater surface area than areas that would have been left as open pits. The deficit would be made up through haulage of growth media from the Lantern project area. Long-term productivity of the growth media would be restored after reclamation is completed and vegetation is established.

3.5.5 Vegetation

Vegetation removed over the active mine life would be re-established to meet wildlife habitat and livestock grazing goals consistent with agency policies and approved plans. Long-term productivity would be forfeited for those areas remaining as open pits in lieu of the economic benefits provided by the Project. Some offsets may occur as a result of reclamation of waste rock disposal facilities and backfilled mine pits that create a greater surface area than the original topography.

Post-mining plant communities would likely differ in species composition from native plant communities for several decades (i.e., higher density of grasses and reduced densities of native forbs and shrubs) (Schuman and Booth 1998; Vicklund *et al* 2004). Though increased density and productivity of grasses would benefit livestock and wildlife with affinities for grassland habitat, it would be detrimental to species dependent on shrub habitat. Practices to achieve these goals look at facility design and seed mixes that are appropriate and consider desired post-mining values.

3.5.6 Terrestrial Wildlife

The Proposed Action is not predicted to change or modify ongoing impacts on mule deer or other species in the vicinity of the Genesis-Bluestar Operations Area. The incremental addition of a 26 acre pit

and 17 acres of connecting haul roads throughout the existing operations area would not measurably add to current wildlife conditions. The proposed reclamation plan would restore long-term productivity to land surfaces that would have been left as open pits.

Species composition and structure associated with reclaimed habitat may be sub-optimal for wildlife species dependent on sagebrush and other shrubs over the long-term (decades) because of reduced densities of big sagebrush and other shrubs. These species may take longer to mature and attain maximum productivity and vigor than herbaceous species. Future use of reclaimed waste rock disposal facilities by wildlife is not known; however, the habitat value is likely to be less as the general biodiversity of the area would be reduced. See Chapter 2 for description of programs being implemented to develop functional post-mining habitat.

3.5.7 Social and Economic Resources

The proposed Project would generate taxes for state and local agencies, provide continued employment in the mining industry, and secondary jobs in retail and service sectors over the mine life. Long-term productivity would be dependent on future uses of mine infrastructure as mining operations in the Carlin Trend decrease. The economic stability of the Elko MSA would be improved if it were possible to maintain a specified level of employment that would result in extended mining activity. In other words, if it were possible to decrease expected production levels in order to extend project life and maintain a particular level of employment for an extended time. Such a scenario would benefit the local economy by increasing stability. However production levels are economic decisions based on the market price of gold and the cost of mining. Because of the need to maintain a skilled work force as Newmont develops various mining projects at its properties on the Carlin Trend, Newmont attempts, to the degree possible, to maintain a stable employment level. The balance between stable employment levels and the ability to maintain a viable operation are decisions that every employer agonizes over – and they are decisions that are best left to the individual operators which must be accountable for the results of those decisions.

3.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Mining and reclamation of the proposed Genesis Project (Proposed Action) and No Action Alternative identified in Section 2.0 of this EIS would result in irreversible and irretrievable commitments of resources and residual effects to the environment. Irreversible commitments of resources are those that cannot be reversed, except over a very long period of time. Irretrievable commitments of resources are those that are lost.

3.6.1 Air

No irreversible or irretrievable commitment of air resources would result from implementation of the Proposed Action or No Action Alternative.

3.6.2 Geology

Removal of gold from the ore would be irreversible as would the resources expended to mine and process it. Under the Proposed Action, backfilling mine pits would likely mean the irretrievable loss of economic recovery of any remaining resources buried by the backfilling. Should pits remain open (No Action) access to remaining resources would be maintained.

3.6.3 Water

No irreversible or irretrievable commitment of water resources would result from implementation of the Proposed Action. Groundwater levels in the Project area would eventually recover to near pre-mining levels.

Compartmentalized groundwater associated with the east wall of the Genesis Pit does not support any surface water features (springs, seeps, or stream flow) in the Project Area. As such, no irreversible commitment of surface water resources would result from drawdown of this perched groundwater zone. Natural recharge to this zone from precipitation would restore perched groundwater zones over time; however, removing a portion of the Gen Fault by expanding the Genesis Pit may alter the location of some perched groundwater zones.

3.6.4 Soil

No irreversible or irretrievable commitment of soil resources would result from implementation of the Proposed Action. Soil salvaged during initial development of the Genesis-Bluestar Operations Area and subsequent salvage associated with the Proposed Action would be used during reclamation to establish a sustainable vegetative cover on disturbed areas. Soil would continue to develop over time from parent materials (waste rock) excavated during mining operations.

3.6.5 Vegetation

With the exception of pit highwalls that would remain after mining, establishment of plant communities through implementation of the proposed reclamation plan would return cover to areas disturbed by mining. Some species may require decades to become established as seed sources associated with native vegetation in adjacent areas establish within reclaimed areas.

With the exception of pit highwall areas, there would be no irreversible or irretrievable loss of range productivity. Control of noxious weeds during reclamation would avoid loss of range productivity. Pit benches associated with remaining highwalls would stabilize over time and develop growth media (fines) that would support vegetation. Vertical faces of pit highwalls are not expected to support vegetation.

There would be no irreversible or irretrievable commitment of resources to special status plants.

3.6.6 Terrestrial Wildlife

Reclamation would include practices that emphasize facility design and seed mixes that are appropriate and consider post-mining desired values. Reclamation of disturbed areas including backfilled mine pits would support wildlife habitat, livestock grazing, and dispersed recreation. Reclamation methods would be employed that are technically effective, cost efficient, and require no post-reclamation maintenance to ensure continued performance. Disturbed surfaces would be re-established to support desired self-sustaining vegetation communities, control precipitation infiltration, and minimize erosion and sedimentation. Areas of open pits that are not reclaimed would remain uninhabitable by some species.

3.6.7 Social and Economic Resources

No irreversible and irretrievable commitment of socioeconomic resources has been identified as a result of the Genesis Project.

4.0 CONSULTATION, COORDINATION, AND PREPARATION

4.1 SCOPING

The Elko District Office (Elko Field Office at the time) determined the proposed Plan of Operations for the Genesis Project was complete on January 9, 2008. An ID Team to consider the impacts of the project and the appropriate level of NEPA analysis was assigned the following week. On February 12, 2008, having reviewed the issues, the Elko District Office determined an Environmental Impact Statement was required. On March 11, 2008, the Elko District Office sent a letter to Newmont Mining which identified four issues as having potentially significant impacts: 1) Impacts to wildlife habitat and migration corridors, 2) Extension of employment at the mine and related economic impacts, 3) Dewatering, particularly if connected to regional groundwater issues, and 4) Release of toxic materials, e.g. mercury, including from processing of ores off site. A number of more minor issues to be considered were also identified.

A Notice of Intent to prepare the EIS was published in the Federal Register (Volume 73, Number 53 pg. 14484) on March 18, 2008. BLM mailed a scoping package that included a project summary and maps to individuals and organizations listed on the Elko District Office mailing list. In addition, the scoping package was distributed at the public scoping meeting.

Concurrent with these actions, BLM issued a press release on March 31, 2008, to radio stations and news organizations with coverage in the surrounding geographical regions in Nevada, Idaho, and Utah.
A public scoping meeting was held by BLM in Elko on April 9, 2008. Seventeen members of the public attended, of which one submitted written comments on the Project. Separate meetings were held for the Elko and Eureka County Commissioners. Written responses were received from two individuals and the following, agencies or groups during the public scoping period:

- Elko County Board of Commissioners
- U.S. Fish and Wildlife Service
- Nevada State Historic Preservation Office
- Nevada Division of State Lands
- Great Basin Resource Watch

The scoping period ended May 22, 2008. No scoping comments were received after that date.

4.2 PUBLIC REVIEW OF THE DRAFT EIS

The Draft EIS will be available for public review over a 45-day comment period from the date the Notice of Availability is published in the Federal Register. All parties on the Elko District Office mailing list or interested parties will receive a hard paper copy, compact disc, or be notified of the availability of the EIS on the Elko District Office website, depending on the specific wishes of each party as communicated to the Elko District Office. Additional paper copies will be available at the Elko District Office and an electronic copy will be on the website until the comment period and appeal period for the Record of Decision have expired.

4.3 CONSULTATION AND COORDINATION WITH FEDERAL, STATE, LOCAL AGENCIES, AND TRIBES

4.3.1 COOPERATING AGENCIES

Cooperating agencies in preparing the EIS include:

- Nevada Department of Wildlife (Wildlife issues especially mule deer); and
- Elko County Board of Commissioners (Socio-economic input)
- Region 9 of the U.S. Environmental Protection Agency, in concert with a Memorandum of Understanding signed with the Nevada State Office BLM, has been consulted regarding content of particular interest to the EPA. The EPA has been informally treated as a Cooperating Agency as a result of the agreement documented in the MOU.

4.3.2 CONSULTATION WITH OTHERS

In addition to the cooperating agencies identified above, the following state and federal agencies and other entities were consulted during preparation of the EIS:

- Nevada Department of Conservation and Natural Resources
- Nevada Department of Human Resources
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- Te-Moak Tribe Environmental Department
- Eureka County Commissioners

4.3.3 NATIVE AMERICAN CONSULTATION AND COORDINATION

In accordance with Federal legislation and executive orders, Federal agencies must consider the impacts their actions may have to Native American traditions and religious practices. Consequently, BLM must take steps to identify locations having traditional/cultural or religious values to Native Americans and insure that its actions do not unduly or unnecessarily burden the pursuit of traditional religion or traditional life-ways.

The National Historic Preservation Act (P.L. 89-665), the National Environmental Policy Act (P.L. 91-190), the Federal Land Policy and Management Act (P. L.94-579), the American Indian Religious Freedom Act (P.L. 95-341), the Native American Graves Protection and Repatriation Act (P.L. 101-601) and Executive Order 13007 require that BLM provide tribes opportunities to actively participate in the decision making process.

The proposed Genesis Project lies within the traditional territory of the Western Shoshone. However, BLM has not received any information regarding specific spiritual/cultural/traditional activities and sites or Traditional Cultural Properties within or in close proximity to the Project boundary.

In June 2008, the BLM Elko District Office initiated formal Native American consultation by sending a notification letter to the following groups:

- Te-Moak Tribal Council;
- Battle Mountain Band Council;
- Elko Band Council;
- Wells Band Council; and
- Duck Valley Sho-Pai Tribes.

Detailed Tribal coordination and communication files are on file at the BLM Elko District Office and are considered confidential. To date, formal and informal consultation efforts have not identified any specific Western Shoshone Traditional Cultural Properties within or in close proximity to the Genesis Project boundary.

4.4 DISTRIBUTION OF THE DRAFT EIS

This Draft EIS was distributed as follows:

- In accordance with CEQ regulations, a Notice of Availability for this Draft EIS was published in the Federal Register.
- A news release was provided to all area media by BLM at the beginning of the 45-day comment period on the Draft EIS.
- The Draft EIS was distributed to interested parties identified in an updated EIS mailing list (**Table 4-1**). The Draft EIS was also posted on the BLM Elko District Office website.

4.5 DISTRIBUTION OF FINAL EIS

The Final EIS will be distributed as follows:

- Notice of Availability will be published in the Federal Register;
- Copies of the Final EIS or Abbreviated Final EIS will be sent to addresses on the mailing list.
- The Final EIS will be posted on the BLM Elko District Office website.
- A news release will be issued to the same news outlets used for previous Project announcements.

4.6 RECORD OF DECISION

A Record of Decision will be distributed by BLM to individuals and organizations identified on the updated Project mailing list. A news release will be provided to the news media

TABLE 4-1
Genesis Project
Elko District Office Mailing List

Federal Agencies

Bureau of Land Management, Washington, D.C.

Bureau of Land Management, Nevada State Office

Bureau of Land Management, Battle Mountain District Office

Bureau of Land Management, Carson City District Office

Bureau of Land Management, Ely District Office

Bureau of Land Management, Las Vegas District Office

Bureau of Land Management, Winnemucca District Office

Department of Energy, Office of Environmental Compliance

Library of Congress

Office of Environmental Policy and Compliance

Office of Public Affairs

U.S. Department of the Interior, Natural Resources Library

U.S. EPA - Region IX, Office of Federal Activities

U.S. EPA Office of Federal Activities

U.S. Fish & Wildlife Service

U.S. Geological Survey

Office of Environmental Policy and Compliance

State Agencies

Bureau of Mining Regulation and Reclamation (NDEP)

Dept. of Natural Resources (Eureka County)

Nevada Department of Wildlife

Nevada State Clearing House

University of Nevada Library

Delamare Library, University of Nevada, - Reno

Local Government

Elko County Planning and Zoning Division

Elko County Board of Commissioners

Elko County Manager

Humboldt River Basin Water Authority

Companies and Organizations

Bullion Monarch Mining

Local Government (continued)

Centerra (U.S.) Inc

Great Basin Resource Watch

Hollister Mine

Nevada Mining Association

Newmont Mining Co

Royal Gold

Western Mining Action Project

Western Watersheds Project

KRP Consulting, Inc.

Tribes

Battle Mountain Band Council

Duck Valley Sho-Pai Tribes

Elko Band Council

Te-Moak Tribal Council

Wells Band Council

Individuals

Robert Michna

Mark Dubois

Joe Armstrong-Nelson

Thom Seal

B. Sachau

Joseph A. Laravie

Elected Officials

Honorable Harry Reid

Honorable John Ensign

Honorable Dean Heller

Dean Rhoads (State Senate)

John C. Carpenter (State Assemblyman)

Pete Giocoechea (State Assemblyman)

Don Gustavson (State Assemblyman)

5.0 LIST OF PREPARERS AND REVIEWERS

5.1 BUREAU OF LAND MANAGEMENT

Interdisciplinary Team		
Team Member	**Technical Specialty**	**Education and Experience**
Kirk Laird	EIS Project Manager Geology and Mineral Resources Groundwater Quantity Hazardous Materials Social and Economic Resources	B.S. Geology B.S. Oceanography MBA 16 years experience
Allen Mariluch	EIS Assistant Project Manager	24 years experience
Mark Dean	Air Quality Water Resources Soil Resources	B.S. Watershed and Earth Systems 4 years experience
Nycole Burton	Vegetation Terrestrial Wildlife Special Status Species	M.S. Animal Science / Natural Resources 9 years experience
Danielle Storey	Native American Consultation	M.A. Anthropology 9 years experience
Bryan Hockett	Cultural Resources	Ph.D. Anthropology 29 years experience
Tamara Hawthorne	Recreation and Visual Resources	B.A. Environmental Planning 8 years experience

5.2 COOPERATING AGENCIES

5.2.1 Nevada Department Of Wildlife

Ms. Katie Miller

5.2.2 Elko County

Elko County Board of Commissioners (Ms. Sheri-Eklund Brown, contact)

5.3 NEWMONT MINING CORPORATION

Paul Pettit
Roger MacGregor
Meg Burt
Brant Ivey

5.4 THIRD PARTY EIS CONTRACTOR

AMEC Geomatrix, Inc.		
Team Member	**Technical Specialty**	**Education and Experience**
Terry Grotbo	EIS Project Manager Geology and Minerals Soil Resources	B.S. Earth Science 30 years experience
Joe Murphy	EIS Assistant Project Manager	B.A. Geography 35 years experience
Doug Rogness	Water Resources Geology and Minerals Environmental Geochemistry	B.S. Geology M.S. Hydrology 26 years experience
Larry Peterson	Environmental Geochemistry	B.S Chemistry M.S Geochemistry 19 years experience
Bruce Weilinga	Environmental Geochemistry	B.S. Microbiology Ph.D. Biochemistry / Microbiology 15 years experience
Judd Stark	Soil Resources	B.S. Land Rehabilitation 10 years experience
Joe Elliott	Vegetation Terrestrial Wildlife Special Status Species	B.S Biology and Chemistry Ph.D. Botany 38 years experience
Karen Lyncoln	Social and Economic Resources	B.A. Urban Studies 36 years experience
Sonia Hutmacher	Document QAQC	B.A. Geology M.A. Anthropology & Applied Archaeology 15 years experience

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APPENDIX A
ADAPTIVE MANAGEMENT PLAN
FOR WASTE ROCK

ADAPTIVE MANAGEMENT PLAN FOR WASTE ROCK

GENESIS PROJECT

Prepared for:

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1.0 INTRODUCTION AND BACKGROUND

Newmont Mining Corporation (Newmont), in conjunction with the Bureau of Land Management (BLM) and the Nevada Division of Environmental Protection (NDEP), developed this Adaptive Management Plan (AMP) to verify predicted waste rock behavior associated with development of the proposed Genesis Project. The AMP identifies ongoing waste rock characterization work associated with current mining operations, future waste rock monitoring associated with the proposed project, and management actions that could be employed to manage potential acid generating (PAG) waste rock should supplemental testing indicate an increased volume of PAG above the volume included in current mine plan designs.

The Genesis Project consists of expansion of existing mining operations associated with the Genesis-Bluestar Operations Area which has been in operation since the 1970s. Expansion of operations would include increasing the size of the existing Genesis Pit, development of the Bluestar Ridge Pit, complete backfilling of two existing mine pits, partial backfill of the Genesis Pit, and vertical expansion of two existing external waste rock disposal facilities. Total new disturbance would be 43 acres.

Supplemental rock characterization and confirmation testing associated with this AMP is scheduled to be completed within the first year of the Genesis Project. Should results of the testing indicate implementation of a revised PAG management method, Newmont would review PAG waste rock management with BLM and NDEP. Assuming that the engineered response for management of additional PAG waste rock can be implemented within the footprint of previously approved and existing facilities at the Genesis Bluestar Operations Area, Newmont would proceed with the necessary construction and revised or modified PAG waste rock management program. Modification to the approved waste rock management plan would require approval by NDEP and BLM and may require adjustment to bonding levels to accommodate the revised management plan.

The Genesis Project - Waste Rock Management Plan (WRMP), which is a component of Newmont's Water Pollution Control Permit, has been approved by NDEP (Newmont 2009). Specific components of the WRMP are summarized in this document. The WRMP would be conducted concurrently with the AMP and would be continued and modified as necessary throughout the life of the mine. Waste rock monitoring protocols and reporting requirements associated with the WRMP would be implemented from initiation of mining.

As part of this AMP, supplemental static net carbonate value (NCV) as determined through LECO furnace analysis, paste pH, and acid-base accounting (ABA) tests in conjunction with kinetic humidity cell tests will be initiated to augment previous tests completed by Newmont used in design of the Genesis Project and confirm operational PAG waste rock identification criteria.

Previous geochemistry studies conducted for the Genesis Project included twenty (20) humidity cell tests selected from 34 composite samples (Geomega 2008). These 34 samples were composited from 533 individual samples, taken from 81 boreholes, representing ~95% of all combinations of lithology/alteration and net carbonate value (NCV) to be mined in the Genesis area.

Samples used for humidity cell tests were selected based on static test results (i.e., meteoric water mobility procedure (MWMP), biological acid producing potential (BAPP), peroxide acid generation, and NCV testing) which identified the samples that are "uncertain" in terms of their ability to generate acid. These 20 humidity cells were selected to be representative of 440.5 million tons (Mt) of waste rock to be mined during the Genesis, West Genesis Phase I, and II.

Newmont's Plan of Operations (POO) for the Genesis Project identifies approximately 449.5Mt of waste rock to be mined during the life of the project. Results of waste rock characterization representative of 440.5Mt as indicated above are also representative of the projected 449.5Mt. The discrepancy is the result of the specific pit design that was used during initiation of the geochemistry study and subsequent refinements to the pit configuration now included in the Genesis Project POO (Newmont 2009).

Discrepancies in the acid generation potential of the OS and OCD waste rock were noted for material with an NCV between 0.0 and 0.21 percent CO_2. Samples with NCV of 0.26 percent CO_2 or greater reported static and kinetic test results that confirmed the original NCV classification as non-PAG (NPAG). Based on the existing data set, samples with an NCV of 0.0 to 0.26 percent CO_2 are considered "uncertain" in terms of classification.

Under this AMP, samples with a range of NCV of 0.0 to 0.26 percent CO_2 would be subjected to humidity cell tests to confirm prior kinetic testing. Under this criterion, the maximum amount of waste rock that would require management as PAG would be approximately 128Mt (about 28 percent of the total waste rock produced during the Genesis Project).

Terms

The term "Potential Acid Generating" or the acronym "PAG" has been used extensively in the mining industry to describe waste rock that has the potential to generate acid upon exposure to oxygen and water. Although there is a general understanding and acceptance of the term, its use in certain contexts has different meanings. The following describes the two different but related meanings of this terminology:

PAG in Waste Rock Characterization: The use of the term "potential" when used in describing "potential acid-generating or PAG" waste rock in the context of results of static testing (acid-base accounting) identifies a range of rock characteristics whose behavior in the environment is "uncertain". Rock types that are classified in this range typically require additional testing (kinetic tests) to determine if the rock is acid generating or non-acid generating.

PAG in Waste Rock Management: Use of the term "potential" in the context of waste rock management where rock classified as acid-generating based on kinetic testing described above, means management of acid-generating rock in such a manner that it will be isolated from oxygen and water. Isolation of this material will limit the possibility of acidic conditions being created where constituents are released from sulfidic or acid-generating waste rock. Therefore, the term Potential Acid Generating or PAG in this context refers to rock that has been classified as acid-generating but because of the way it is managed (encapsulation cells), the "potential" for the rock to generate acid is mitigated.

2.0 OBJECTIVES

The objective of this AMP is to accomplish the following goals:

- Complete supplemental waste rock characterization (SWRC) studies to verify and augment previous geochemistry study results concerning classification of waste rock associated with the Genesis Project, as necessary, revise or modify the Waste Rock Management Plan.
- Implement modified waste rock management action plan (if necessary) with the appropriate engineering controls to prevent unnecessary or undue degradation of the environment and meet water quality standards.
- Revise or modify Newmont's field classification and laboratory program for waste rock to address results of the SWRC studies,
- Establish a monitoring program to be used during life of mine operations of the Genesis Project by which change in waste rock classification, as determined by subsequent testing, will be identified and the operation modified or suspended to address those changes as necessary.

The preferred management action for PAG waste rock associated with the Genesis Project is to maximize encapsulation of PAG as backfill in mined-out pits and in existing external waste rock disposal facilities (WRDF) over the life of the operation. The primary reason for this preference is to take advantage of the mine site characteristics; specifically, presence of an extensive limestone formation (Roberts Mountain Formation) that underlies the mine pit area and the presence of mined-out pits in the Genesis-Bluestar Operations Area that can be backfilled with waste rock generated from expansion of the Genesis Pit and development of the Bluestar Ridge Pit. Placement of PAG as backfill in mined-out pits would result in PAG waste rock contacting limestone which provides buffering to acidic leachate that could result from PAG materials.

3.0 CONSULTATION

As indicated previously, this Adaptive Management Plan for Waste Rock Management for the Genesis Project was developed in consultation with the Nevada Division of Environmental Protection (NDEP) and the BLM – Elko District Office.

NDEP administers Nevada's Water Pollution Control Permit program which is the primary regulation that applies to protection of groundwater quality at mine sites. NDEP, through implementation of a waste rock management plan (WRMP) as a requirement of a Water Pollution Control Permit, receives waste rock monitoring data during the life of the mining operation. Monitoring data is used to ensure that waste rock is being properly classified during mining (PAG vs NPAG) and is appropriately disposed of in facilities designed to accept the waste rock.

BLM is the surface management agency for public land included within the proposed Genesis Project area. BLM's regulations require that mining be conducted in a manner that does not cause "unnecessary or undue degradation". BLM regulations at 43 CRF 3809.401 requires that the operator submit and BLM review preliminary or conceptual designs, cross sections, and operating plans for mining areas, processing facilities, and waste rock and tailing disposal facilities [43 CRF 3809.401 (b)(2)(ii)], rock

characterization and handling plans [43 CRF 3809.401 (b)(2)(iv)], and monitoring plans [43 CRF 3809.401 (b) (4)].

Newmont, the Genesis Project proponent, has developed a waste rock characterization data base that has been used to design a Waste Rock Management Plan (WRMP) to address the volume of PAG waste rock to be generated as a result of the project (see WRMP in **Section 4** below). The WRMP has been submitted to NDEP as part of Newmont's Water Pollution Control Permit renewal application for the North Area Leach Facility. The WRMP has also been summarized in the Plan of Operations (POO) submitted to BLM in conformance to BLM regulations.

4.0 WASTE ROCK MANAGEMENT PLAN

This section summarizes the current WRMP that has been approved by NDEP in accordance with requirements associated with renewal of the Water Pollution Control Permit (WPCP) for the Genesis Project. In addition, a brief description of WRMPs that were permitted and implemented in the past at the Genesis-Bluestar Operations Area are included. The Genesis-Bluestar Operations Area is included under Newmont's North Area Leach WPCP.

As described under Section 1.0 above, the amount of PAG that would be managed during the life of the mine is 28Mt. For purposes of this AMP, waste rock management for the Genesis Project would follow the Genesis Project WRMP (Newmont 2009) during the interim period as summarized in this Section. The interim period is the time period between receipt of permits and/or authorizations for the Genesis Project and completion of the Supplemental Waste Rock Characterization Studies (SWRC) described below. The planned schedule for completion of supplemental studies is within one year of Newmont receiving the necessary permits and authorizations for the Genesis Project.

Waste rock management for the Genesis Project will follow the WRMP approved by NDEP (Newmont 2009) and the plan of operations (POO) and record of decision (ROD) for the Genesis Project once approved. As stated previously, BLM and NDEP will review the project bonding levels to ensure adequate bond is posted to address management of PAG waste rock material at any time during the life of the Genesis Mine. The planned schedule for completion of supplemental testing studies is within one year of Newmont receiving the necessary permits and authorizations for the Genesis Project.

4.1 Genesis-Bluestar Operations Area – Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan (Newmont 2003)

Past waste rock disposal associated with the Genesis-Bluestar Operations Area has been conducted in accordance with Newmont's Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan (Newmont 1995). This plan describes waste rock classification, disposal facility construction and site preparation, waste rock disposal, PAG encapsulation methods, reclamation/closure methods, and monitoring and reporting. Waste rock disposal at Genesis-Bluestar Operations has occurred under various plans that have been updated over the years. Waste rock management under the current plan (Newmont 2003) differs from previous plans in the following areas:

- Determination of PAG rock by sampling rock from exploration boreholes and analyzing for NCV, BAPP, XRD/XRF, and MWMP;
- Waste rock dump construction protocols including low-permeability base construction, lined seepage collection ponds;
- PAG waste rock encapsulation cell design and construction, placement of a 10-foot thick Encapsulation material layer (NPAG waste rock with an ANG/AGP ratio of 3:1) on the bottom, top, and sides of the PAG waste rock cell;
- Placement of an engineered cap;
- Waste rock dump inspections conducted on a quarterly basis to detect possible abnormal conditions. Quarterly monitoring includes fluids and solids that may accumulate;
- Monitoring of waste rock includes preparation of weight-averaged composites on a biannual basis which are analyzed using the MWMP and acid-generation/acid neutralization potential tests. Results of tests are included in quarterly reports for the facility.

Current permitted Waste Rock Disposal Facilities (WRDFs) associated with the Genesis-Bluestar Operations Area include the Section 5 and Section 36 WRDFs. Both of these WRDFs have been authorized to encapsulate PAG waste rock generated during current operations. Any new facility constructed or existing facility expanded laterally beyond the pre-2003 footprint must be constructed and managed in accordance with the January 2003 plan (Newmont 2003).

4.2 Genesis Mine – Waste Rock Management Plan

Newmont has prepared and submitted a WRMP for the Genesis Project as part of a renewal and amendment of their North Area Leach Operations Water Pollution Control Permit (NEV0087065) (Newmont 2009). A summary of the WRMP is included in this section with a description of the types of waste rock disposal facilities that would be expanded and/or new facilities constructed; design of PAG waste rock encapsulation cells within the facilities; waste rock monitoring program during mining operations; and the reporting program. The detailed plan is available through NDEP and BLM. Encapsulation cells that have been designed for the Genesis Project provide for a total capacity of 31Mt; predicted tonnage of PAG waste rock to be produced during the Genesis Project is 28Mt (Newmont 2008).

Newmont proposes to use existing mined-out pits (i.e., Beast and Bluestar pits) located within the Genesis-Bluestar Operations Area for placement of waste rock generated during development of the Genesis Project. Backfill operations would also include partial backfill of the Genesis Pit during the life of the operation. In addition, Newmont would use two existing external waste rock disposal facilities (Section 5 and Section 36 WRDFs) for waste rock disposal associated with the proposed expansion. Waste rock placement in these facilities would result in increasing the vertical height of the disposal facilities and increase the amount of PAG that would be placed in each of these WRDFs.

PAG waste rock would be managed by encapsulation in backfilled pits and in the existing external WRDFs. Current design includes construction of seven PAG waste rock encapsulation cells (five cells in backfilled pits and two cells in existing external waste rock disposal facilities). NPAG rock would be placed in the bottom of the Genesis Pit to a level above the projected elevation of the pre-dewatering water table. The Beast and Bluestar pit bottoms are above the projected elevation of the pre-

dewatering water table. PAG waste rock would be placed in select locations above the recovered water table elevation and would be placed on either limestone benches of the mine pit and/or on NPAG backfill. Encapsulation material (waste rock with an ANP:AGP ratio of 3:1) would be placed on the bottom, above, and on the sides of the PAG waste rock cell to a minimum thickness of 10-feet to complete the encapsulation design.

In circumstances where PAG waste rock would be placed directly on limestone benches within mined-out pits, Newmont would drill, blast, dozer rip, and grade to slope the surface of the limestone prior to placement of PAG waste rock (**Figure 1**). Similar to placement of Encapsulation material under the compacted PAG waste rock described above, this treatment of the limestone bench is designed to promote drainage of meteoric water around the PAG material and limit contact of meteoric water with PAG waste rock.

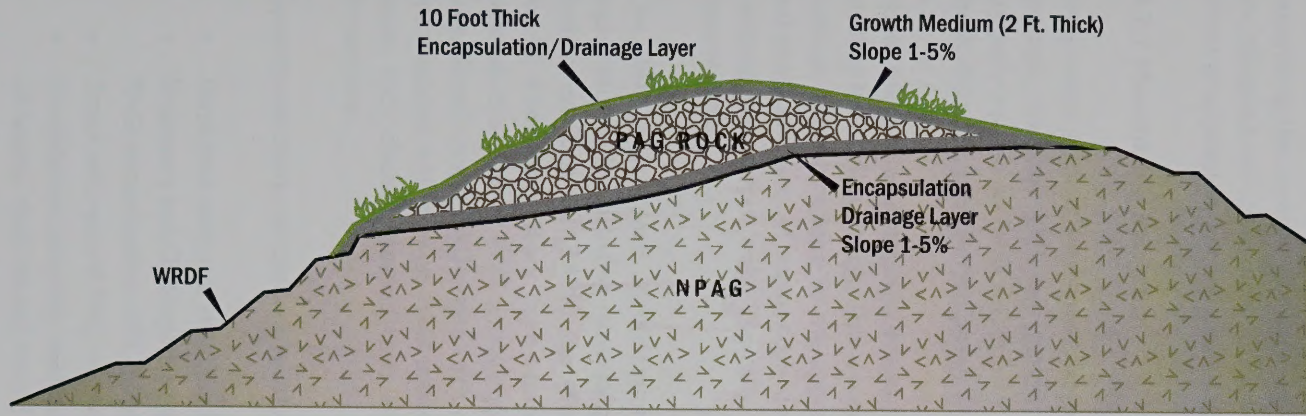
The PAG waste rock would be compacted using random wheel compaction techniques on each lift of PAG waste rock as it is placed in the cell. Compaction of the PAG waste rock would decrease the permeability of the PAG in contrast to the Encapsulation material that would surround the PAG waste rock. In addition to it acid buffering characteristics, Encapsulation material would function as a drainage layer surrounding the compacted PAG waste rock; directing meteoric water around the compacted PAG waste rock. The drainage function of the Encapsulation material would limit contact of meteoric water with PAG waste rock thereby reducing the potential for acidic leachate to form.

Vertical expansion of the existing external WRDFs includes construction of PAG waste rock encapsulation cells within NPAG waste rock. PAG waste rock would be encapsulated with a minimum 10-foot thick layer of Encapsulation material (material with an ANP:AGP ratio of 3:1) surrounding the sides and top of the cell. Random wheel compaction of the PAG waste rock and sloping of all surfaces (i.e., Encapsulation material placed under, on top of, and on the sides of the PAG waste rock) would be completed as described previously.

All surfaces of the backfilled pits and external WRDFs would receive a minimum of two-feet of growth media as described in the WRMP approved by NDEP to support establishment of vegetation.

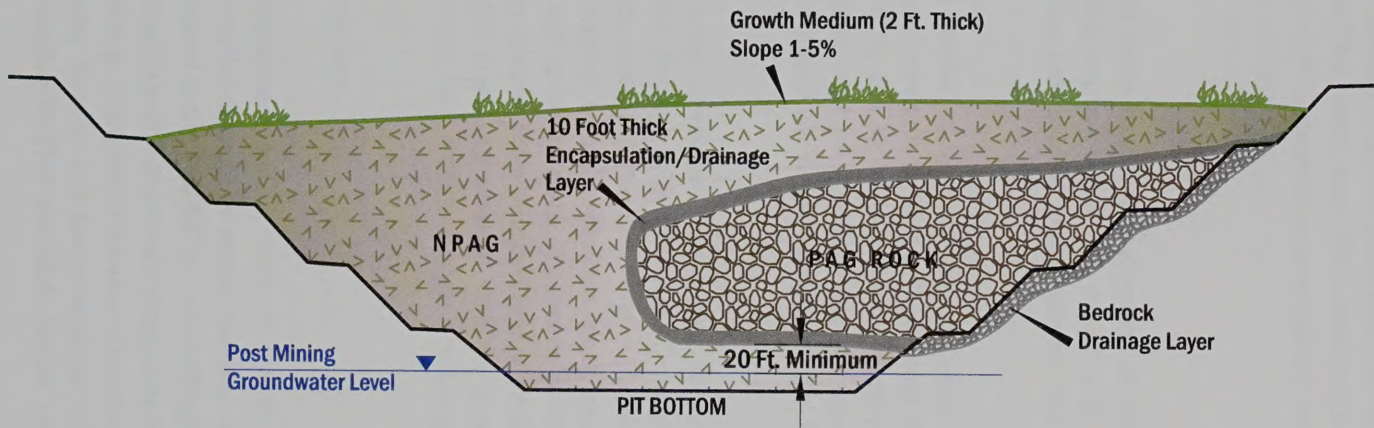
In summary, PAG waste rock encapsulation design is intended to minimize potential for acid drainage by control of the acid generation process which occurs if sulfide minerals such as pyrite react with oxygen and water to form sulfuric acid, which may liberate and mobilize heavy metals. The procedure for controlling acid generation from PAG waste rock is depicted in **Figure 1** and includes:

1. Segregation and placement of PAG waste rock on limestone benches during backfill within the Beast and Bluestar Pit(s), partial backfill of the Genesis Pit, and existing external WRDFs (Section 5 and Section 36). Limestone benches would be drilled, blasted, dozer ripped, and sloped prior to placement of PAG waste rock material. Bottoms of the Beast and Bluestar pits are above the projected elevation of the recovered groundwater table. The bottom of the Genesis Pit is below the elevation of the recovered water table.
2. Total enclosure or encapsulation of the PAG waste rock zone with a minimum 10-foot thick layer of Encapsulation material (NPAG material with an ANP:AGP ratio of 3:1).
3. Proper grading and random wheel compaction of individual lift surfaces of PAG waste rock to reduce the permeability of the material.



TYPICAL EXTERNAL WRDF PAG CELL CROSS SECTION

Not To Scale



TYPICAL PIT BACKFILL WRDF PAG CELL CROSS SECTION

Not To Scale

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Not To Scale

AMEC Geomatrix

Typical PAG Cell Cross Section
Adaptive Management Plan
Genesis Project
Eureka County, Nevada
FIGURE 1

4. Control and diversion of surface water flow (run-on) to prevent infiltration into WRDFs and backfill pits.
5. Reclamation of the entire surface of the WRDFs, including placement of a minimum two (2) foot thick growth media cover as described in the WRMP and approved by NDEP and establishing vegetation to maximize evapotranspiration.

In general, these procedures are based on the strategy that acid generation can best be prevented by minimizing the amount of water which contacts PAG waste rock. PAG waste rock encapsulation cells are designed and constructed to limit exposure of PAG material to atmospheric oxygen, groundwater, direct precipitation, snow melt and storm-water run-on.

4.2.1 Monitoring Program

PAG waste rock is segregated from other rock types based on the results of blast hole kriging and geologic mapping. This segregation ensures PAG waste rock is not mixed with other rock and is properly routed to PAG waste rock encapsulation cells located in the external WRDFs and within the Beast, Bluestar, and Genesis pit(s).

Visual sulfide classification of waste rock is also conducted by Newmont geologists from in-pit samples or blast hole drill cuttings. This visual classification scheme is verified by laboratory analysis of blast hole cuttings. Proper routing to the appropriate WRDFs and pit backfill areas is determined through NCV and paste pH tests of waste rock samples collected from blast holes. Paste pH tests are conducted on oxidized waste rock only. Typically, every third blast hole drilled is sampled for NCV and paste pH determination.

The PAG waste rock identification criteria were developed from core logs and analyses from exploration holes including mineralogy, NCV, ABA, Paste pH, Peroxide Acid Generation, Biological Acid Production Potential (BAPP), humidity cell kinetic tests, and Meteoric Water Mobility test work. NCV results from exploratory core samples were entered into the geologic block model to identify and estimate the mass of PAG waste rock material and to locate areas of concern within the pit expansion area. Based on the PAG waste rock classification criteria, 6 percent or 28Mt of PAG material would be encapsulated within in-pit PAG waste rock backfill areas and external WRDFs. In support of the PAG waste rock characterization tests above, long-term field oxidation tests are being conducted at the Project site.

Operational characterization procedures are as follows:

- Blast hole analyses, including NCV determination by LECO, paste pH, and visual geology;
- Engineers and Geologists establish polygons for mining and special handling of the waste rock to PAG encapsulation cells (polygons are located in the field by field survey/flagging);
- Track and record PAG waste rock handling through Newmont's dispatch system;
- Compliance sampling, analyses and reporting. Compliance samples consisting of 5kg/200K tons of waste rock mined would be collected. Samples are composited by WRDF type and are submitted to a laboratory for analysis including MWMP and ABA. Sample composites would be verified by BLM representatives.

- Quarterly inspections of the WRDFs are conducted through the mutual effort of Newmont Environmental, Geology, Engineering, and Mine Operations departments. The quarterly monitoring would include sampling of any collected fluids which would be analyzed for Profile II parameter list as dissolved constituents. Samples would be filtered and preserved with HNO3; and
- WRDFs would be inspected following periods of heavy spring snow melt or a precipitation event with the potential for run-off. The purpose of the inspection is to monitor the functioning of the facilities, detect any abnormal conditions, and evaluate the need for remedial actions. Observations of unusual flow or ponding would be reported to ensure that solutions are, contained, analyzed, and/or treated as determined by NDEP and BLM remediation requirements.

4.2.2 Data Management and Reporting

Waste rock is sampled and tested as required by the Genesis-Bluestar Operations Area / North Area Leach - Water Pollution Control Permit (NEV0087065) issued by the Nevada Division of Environmental Protection (NDEP), Bureau of Mining Regulation and Reclamation (BMRR). Waste rock samples are combined into weight-averaged composites by the metallurgical lab. A laboratory analyzes the bulk samples for leachability (Meteoric Water Mobility Procedure), acid base accounting (ABA) including acid generation potential (AGP), acid neutralization potential (ANP), and other analytical parameters as required by the permit. Waste rock analyses results are included in permit-mandated quarterly monitoring reports.

5.0 ADAPTIVE MANAGEMENT PLAN

This section describes the supplemental waste rock characterization (SWRC) program; adaptive management plans for waste rock; possible modifications to operational rock classification methods; and possible revisions to the Waste Rock Management Plan resulting from the conclusions of the supplemental waste rock characterization studies. Waste rock characterization efforts will be on-going life of mine activities.

Various plausible Management Actions that would accommodate a volume of PAG waste rock at the proposed Genesis Project that differs from the current plan and encapsulation cell capacity are described in this section (see **Section 4.2**). These Management Actions are designed to address various PAG volume scenarios that could result from SWRC studies; however, other PAG management schemes can arise during the mine life as a function of when PAG rock is encountered in each pit, the volume of PAG that is encountered at specific locations within the mine sequence, and the timing and availability of encapsulation cell capacity within mined-out pits and external WRDFs. These aspects of the mine development can affect the need for modification of PAG management plans during the life of the operation. It is not possible to identify the myriad scenarios that could occur in relation to these mine development aspects; however, the intent of the PAG waste rock management plan is to meet or exceed the encapsulation cell performance ascribed to the proposed design.

5.1 Interim Waste Rock Management Plan

Implementation of the Adaptive Management Plan would occur concurrently with issuance of the Record of Decision for the Genesis Project. Results from the SWRC program may require several months up to a year to complete, Therefore, 20Mt of waste rock to be mined during the first year of mining of waste rock (rock currently classified as NPAG) has the potential to be reclassified as PAG rock as a result of the SWRC program after the waste rock has been backfilled into the Beast Pit. To be conservative and eliminate the potential for rehandling any portion of the 20Mt of waste rock backfilled in the Beast Pit in the first year, the entire 20Mt of waste rock would be managed as PAG until supplemental testing is completed. Waste rock produced after SWRC test results have been confirmed would be managed as determined by the testing results.

Total waste rock tonnage to be placed as backfill into the Beast Pit during the first few years of mining under the current Genesis Project POO is 95.4Mt (91.6Mt NPAG and 3.8Mt PAG). Production of waste rock in the first year of mining would be approximately 20Mt (21 percent of the total amount to be placed as backfill in the Beast Pit). The pit walls and bottom of the Beast Pit in the portion of the pit that could contain 20Mt of PAG waste rock is comprised of Roberts Mountain Formation limestone **(Figure 1)**.

Should all rock placed as backfill in the Beast Pit during the first year of mining be reclassified as PAG as a result of the SWRC study, no change in management of PAG placed in the Beast Pit would be required. All waste rock placed during the first year of mining in the Beast Pit would be located on Roberts Mountain Formation limestone. Irrespective of the classification of the waste rock, placement of waste rock on limestone benches that have been prepared in accordance with those practices described in Section 4.0 would result in creating preferential flow paths for draining meteoric water and limiting or reducing contact with compacted PAG waste rock. As detailed in Section 4.0, pit bench preparation would include drilling, blasting, dozer ripping, and sloping blasted limestone rock to form the drainage layer underneath compacted PAG waste rock.

BLM and NDEP would revise the reclamation bond to address implementation of the Interim Waste Rock Management Plan. The bond amount would ensure that PAG waste rock is properly managed in accordance with the approved plan.

5.2 Supplemental Waste Rock Characterization (SWRC) Studies

The supplemental waste rock characterization (SWRC) study would build upon previous waste rock investigations and laboratory work to revisit and check prior results. The focus of the SWRC program is on those lithologies and alteration products that provided test results that were subject to differing professional interpretations. Completion of supplemental kinetic tests on these materials is intended to resolve those differing interpretations. The supplemental tests would provide additional evidence for operational methods for classifying waste rock as either acid generating or non-acid generating waste rock. For purposes of this discussion, the term "PAG" will be used in its context as waste rock management to define the amount of acid-generating waste rock that would be determined through the SWRC study.

5.2.1 SWRC Design

The study is comprised of the following procedures and protocols:

- The existing NCV block model will be used to target oxide siliceous (OS) and oxidized carbonate decalcified (OCD) rock with uncertain NCV values. Twenty-five samples will be collected for static testing in the NCV range of the 0.0 to 0.88 percent CO_2 to ensure a sufficient sample set for selecting 10 humidity cell tests. Humidity cell tests will focus on the range of NCV where previous geochemistry studies had indicated potential for acidity in some samples (i.e., 0.0 to 0.26 percent CO_2). Selected samples representing a NCV range of 0.26 to 0.88 will be included in the humidity cell testing to confirm the long-term net neutralizing potential observed in previous kinetic testing. The final NCV distribution for 10 humidity cell tests identified below will be reviewed with NDEP and BLM.
- Twenty-five drill hole samples will be taken from five foot intervals containing a single lithology;
- Of the 25 samples, 7 will be oxide siliceous (OS) rock and 18 will be oxide carbonate decalcified (OCD) rock. These samples would be recovered from drilling operations at sites selected through review of the NCV block model. Drilling locations would be selected in consultation with BLM, NDEP, and Newmont representatives;
- Samples will be submitted for NCV, ABA, and paste pH testing;
- Based on results of the static testing, 10 samples (2 OS and 8 OCD rock) will be selected to bracket the NCV range of the samples and these will be submitted for kinetic testing in conformance with EPA technical Document Acid Rock Drainage Prediction (1994) and ASTM standard procedure (D5744-96);
- Selected samples will be submitted to a certified laboratory for conducting the humidity cell tests;
- Splits of the kinetic test samples will be archived for future mineralogy analysis, if needed to support interpretation of the humidity cell test results;
- Humidity cell leachate would be collected and analyzed weekly according to ASTM Standard (D5744-07). Samples collected weekly would be analyzed for redox potential, pH, alkalinity/acidity, conductivity, iron, and sulfate.
- Week 0 and subsequent weekly extracts would be submitted to a Nevada certified analytical laboratory for analysis of NDEP Profile I constituents minus WAD cyanide. Humidity cell leachate will be analyzed weekly, at a minimum, for the following parameters: pH, Eh, conductivity, sulfate, alkalinity/acidity. Additional Profile I/II analysis, as individual weeks or weekly composites, based upon data objectives, will be evaluated on a case-by-case basis.
- Percent pyrite sulfur will be determined by the modified Sobek or NCV method. This value will be converted to the mass of iron and sulfate that could be generated if 100% of the pyritic sulfur is oxidized per the standard pyrite oxidation stoichiometry. The supplemental testing is flexible and the mineralogy of the post test humidity cell solids would be analyzed if a need is identified. Humidity cell test parameter curves will first be used to establish the approximate end point (i.e., 30, 40, 50 weeks) followed by mineralogical analysis of the substrate.

Kinetic tests results would be submitted to the BLM and NDEP at 20 weeks for comparison to the existing humidity cell data set and at 30-weeks for a joint evaluation. If BLM, NDEP, and Newmont

representatives are in agreement that operation of a humidity cell or cells can cease, a written acknowledgement of the decision would be prepared by BLM and NDEP. Decision criteria for cessation of humidity cell tests are described below. Cells that require further testing would be run for an additional 10 weeks with an update to BLM and NDEP after 40 weeks. This process would be repeated until agreement has been reached on results from all cells.

5.2.2 Kinetic Test Decision Criteria

BLM, NDEP, and Newmont will use humidity cell test (HCT) results to determine the net acid generation potential (AGP) of waste rock and relate NCV to observed AGP within samples grouped by lithology and alteration.

Collectively, BLM, NDEP and Newmont will verify the following criteria:

- HCT samples with a net cumulative alkalinity <0 mg/kg and pH < 5 would be considered PAG material.
- HCT samples with a net cumulative alkalinity ≥ 0 and pH >5 would be evaluated using cumulative net alkalinity, percent sulfide sulfur leached, percent carbonate carbon leached, pH, and mineralogy (if needed). HCT samples with pH values greater than 7, large net cumulative alkalinity, and low weekly acidity production would be considered NPAG if the overall depletion rates of sulfide sulfur and carbonate carbon indicates a stable long term trend is in place. Ranking a test cell result as have "large alkalinity" or "low acidity" is dependent on the mass balance of sulfate and carbonate for individual test cells. It is expected that the mass balance for individual samples would change over the period of each cell test.
- Ca/Mg total content/mineral vs. dissolution rate would be considered. Calculations and ratios will be provided to be indicative of a long-term trend.
- HCT samples with pH values between 5 and 7, low net cumulative alkalinity, and weekly acidity production would be considered NPAG if the overall depletion rates of sulfide sulfur and carbonate carbon indicate a stable long term trend is in place (EPA 2003). The ratio of weekly alkalinity to acidity would be evaluated to detect trends in the long term release rates and in combination with percent sulfide sulfur leached and percent carbonate carbon leached to project long term trends.
- Based on the mineralogy of the initial test sample and ABA results, the sulfide sulfur content would be converted to available acidity and carbonate carbon would be converted to available alkalinity. The generated cumulative acidity and alkalinity would be used to track depletion of sulfide and carbonate. This information, combined with the mineralogy data, would be used for making decisions on termination of HCT tests.
- Long term behavior of individual HCT cells may also be assessed based on mineralogical analysis of targeted HCT solids (i.e., 30-week solids) to support conclusions regarding individual HCT results. Mineralogy of weathered HCT solids would provide information regarding mineral consumption and pyrite mineral properties contributing to observed acidity release rates (e.g., pyrite particles encapsulated within secondary mineral oxidation rinds).

5.3 Waste Rock Management

Based on results of the SWRC studies outlined in Section 5.1, the BLM, NDEP, and Newmont will determine the need for adjustment to the PAG management program at the Genesis Mine and/or implementation of a revised management scheme. Any lateral expansion of a pre-2003 facility footprint must be designed, constructed, and monitored in accordance with the Newmont Mining Corporation Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan (Newmont 2003).

Based on the current geochemistry information developed for the Genesis Project and assuming that results of the supplemental studies do not confirm prior geochemistry work, the primary issue that could need redress in terms of PAG waste rock management at the Genesis Project is the total volume of PAG rock that will be produced and the adjustment in capacity and/or location of encapsulation cells needed to accommodate the change in volume.

For purposes of identifying engineering responses to possible SWRC study results, the following PAG management actions are described with the specific mechanism that would trigger implementation of the method. All management actions described in this section are located within the proposed disturbance boundary.

Should SWRC results indicate an additional amount of PAG waste rock would require management during the life of the Genesis Project, the actual sequence of waste rock management in terms of which PAG encapsulation cell would receive PAG waste rock and the timing of placement is unknown. The uncertainty arises from the timing of when the SWRC results become available, which waste rock is to be reclassified, and where the reclassified waste rock is located throughout the mine pit development.

Under the current PAG management plan included in the POO, the maximum exposure of PAG waste rock that would occur during the life of the Genesis Project would be 25 acres. The maximum acreage of open PAG cell that could occur during waste rock placement under Management Actions described below is 50 acres.

5.3.1 Current PAG Management

As described previously, the predicted volume of PAG that would be encapsulated in backfill of pits in the Genesis Project is 28Mt based on waste rock with NCV of less than 0.0 percent CO_2. PAG placement and encapsulation is summarized in Section 4.0 of the AMP. A detailed description is included in the Genesis Project Waste Rock Management Plan (Newmont 2009).

5.3.2 Management Action No. 1

<u>SWRC Value:</u> 28Mt – 128Mt of PPAG: This amount of waste rock tonnage would be reclassified as PAG based on SWRC results for waste rock with an NCV of 0.0 - 0.26 percent CO_2. This range of PAG tonnage would be determined from SWRC results that report an additional 100Mt of waste rock classified as PAG which would be added to the original 28Mt of PAG waste rock addressed in the Genesis Project POO.

Engineered Response: Encapsulation of this volume of PAG waste rock would require expansion to all 7 proposed PAG waste rock encapsulation cells included in the Genesis Project. **Figure 2** identifies the footprint of the expanded PAG encapsulation cells. PAG encapsulation cells would increase in aerial extent and thickness. Expansion of proposed encapsulation cells under this Management Action would result in all PAG waste rock being located above the rebounded water table in all cell locations.

Management of PAG under this Management Action would be similar to that proposed for the Genesis Project. The amount of Encapsulation material (ANP/AGP ratio of 3:1) that would be needed to meet the encapsulation criteria of a minimum 10-foot thick layer on the top, sides, and bottom of each cell under this Management Action is 17.2Mt (**Table 1**). Preparation of limestone benches in backfilled pits (Beast, Bluestar, and Genesis pits) as described in Section 4.0 to function as the bottom drainage layer for PAG encapsulation cells would reduce the amount of Encapsulation material needed to meet the drainage layer requirements.

5.3.3 Management Action No. 2

In the event that SWRC tests result in an amount of PAG that exceeds the amounts associated with Management Action No. 1 outlined above, waste rock management operations may require modification that exceeds the disturbance footprint associated with the approved POO for the Genesis Project. In the event that the amount of PAG waste rock cannot be managed in accordance with an approved plan at any time during the life of the operation, operations may be suspended until such time that a revised PAG waste rock management plan can be developed, reviewed, evaluated, and bonded under BLM and NDEP regulations.

6.0 WASTE ROCK MANAGEMENT MONITORING PROGRAM REVIEW

In conjunction with selection of a Waste Rock Management Action under **Section 4.2**, the BLM and NDEP would review the existing WRMP for the Genesis Project to determine whether any adjustments or modifications are warranted, amend the POO and WRMP as necessary, and conduct the appropriate level of review under 43 CFR 3809, (NAC) 445A.350-NAC 445A.447 and (NAC) 519A.010 - NAC 519A.415, (NRS) 445A.300-NRS and NEPA. The focus of the review would be on adequacy of the program to measure PAG rock, monitor management, reporting to agencies and ensure the monitoring protocols in the WRMP are sufficient to meet future monitoring needs for the Project.

7.0 PERFORMANCE REVIEW

BLM, NDEP, and Newmont would review the performance of the waste rock testing, reporting results, and implementation of all phases of the AMP on a quarterly basis for the life of mine. Newmont would provide quarterly reports detailing accomplishments and attainment of goals as listed under **Section 2.0** – Objectives. Agency meetings with Newmont would be conducted as necessary to discuss report findings, review future work and schedules for the AMP, determine additions or modifications to the AMP, amendments to the POO and the level of NEPA as necessary.

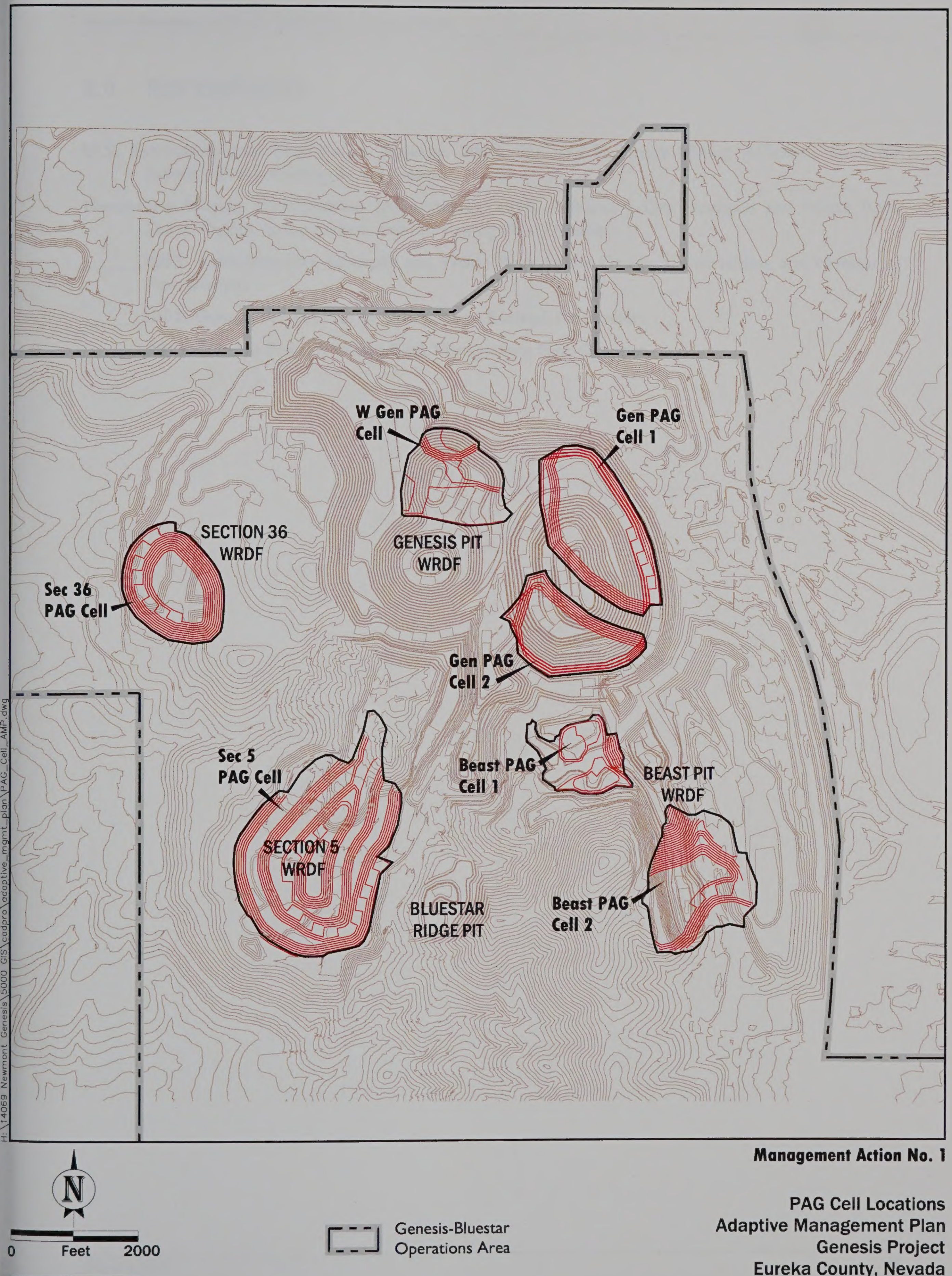
TABLE 1 Genesis Project PAG Cell and Encapsulation Material Management Action No. 1		
PAG Cell	**PAG Waste Rock Encapsulation Cell Capacity (ktons)[1]**	**Encapsulation Material (ktons)[1]**
Beast PAG Cell 1	4,600	1,600
Beast PAG Cell 2	26,000	3,500
Genesis PAG Cell 1	18,800	3,300
Genesis PAG Cell 2	11,900	2,200
West Genesis PAG Cell	5,000	973
Section 5 PAG Cell	57,400	3,700
Section 36 PAG Cell	14,900	2,000
Total	**138,600**	**17,300**

PAG = Potentially Acid-generating; ktons = 1,000 tons.
[1] Material amounts have been rounded to the nearest 1,000 tons.

Table 2 shows the annual production of Encapsulation material versus the amount of PAG waste rock produced.

TABLE 2 Genesis Project PAG Waste Rock and Encapsulation Material Annual Production (ktons)[1]		
Mine Year	**PAG Waste Rock[2]**	**Encapsulation Material**
1	2,400	11,000
2	3,700	20,700
3	8,400	16,100
4	11,300	24,600
5	19,970	9,800
6	19,100	12,400
7	13,600	23,500
8	10,500	39,100
9	21,000	19,000
10	14,800	10,900
11	1,700	447
12	938	892
Total	**127,600**	**188,400**

PAG = Potentially Acid-generating; ktons = 1,000 tons.
[1] Material amounts have been rounded to the nearest 1,000 tons.
[2] PAG waste rock amount based on material with NCV less than 0.26 percent CO_2.



AMEC Geomatrix

Management Action No. 1

PAG Cell Locations
Adaptive Management Plan
Genesis Project
Eureka County, Nevada
FIGURE 2

8.0 REFERENCES

U.S. Environmental Protection Agency. 2003. EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska.

Newmont Mining Corporation (Newmont). 1995. Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan. October.

______**2003.** Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan. January.

______**2007.** Genesis Project Plan of Operations - Revised. November.

_______**2009.** Genesis Project, Waste Rock Management Plan. October.

APPENDIX B
GENESIS PROJECT GEOCHEMISTRY

APPENDIX B
GENESIS PROJECT GEOCHEMISTRY

INTRODUCTION

This section summarizes the geochemical characterization and geochemical modeling of the Genesis Project, conducted by Geomega, Inc. (Geomega) for Newmont Mining Company (Newmont). This review evaluates potential long-term environmental impacts of the Proposed Action and No Action alternatives associated with the Genesis Project. The Proposed Action involves expansion of mining activities and complete backfilling of the Bluestar and Beast pits, and partial backfilling of the Genesis pit, as described in Chapter 2 – "Proposed Action and Alternatives" of this Draft EIS. The No Action alternative would involve no change to the existing approved plan of operations. Under this alternative, backfilling of mine pits would not occur and a pit lake (about 40 acres) would form in the Genesis pit when dewatering of the Betze/Meikle-Post and Leeville mines is discontinued.

As part of the permitting process, geochemical properties of waste rock and pit wall rock were evaluated to assess geochemical effects to water resources, including groundwater, surface water, and for the No Action alternative, a pit lake that would develop in the Genesis pit. Newmont contracted Geomega to conduct the geochemical characterization of rock and to run numerical models to predict future environmental impacts resulting from each of the two alternatives (Geomega 2008a, 2008b, 2008c).

Predictive models generally incorporate integrated components that include water balance and chemical mass balance. The water balance typically includes surface water and groundwater flow components that estimate the movement of water in and out of the system. Chemical inputs to the system are generally derived from site-specific testing and are evaluated using geochemical models that can assess the contribution of precipitation/dissolution and adsorption/desorption reactions on chemical mass balance and transport.

The following sections present a review of geochemical inputs to the modeling completed to evaluate the Proposed Action and No Action alternatives.

GEOCHEMICAL CHARACTERIZATION

Geochemical inputs for the pit lake and flow/transport groundwater modeling were derived from pit wall rock and waste rock characterization studies conducted by Geomega (2008a). The objective of these studies is to:

- Assess the acid generating and acid neutralizing potential of exposed pit wall rock and waste rock; and
- Characterize potential leachate chemistry of wall rock and waste rock to provide geochemical inputs to the predictive models.

Under both alternatives, geochemical inputs to the models were derived from the same sampling and analytical data set.

The geochemical characterization involved a robust testing and analysis program that included:

- Net carbonate value (NCV) classification;
- Acid-Base Accounting (ABA);
- Whole rock chemistry;
- Mineralogy;
- Biological Acid Production Potential (BAPP);
- Peroxide Acid Generation;
- Paste pH;
- Meteoric Water Mobility Procedure (MWMP);
- Humidity cell;
- Field oxidation tests; and
- Batch attenuation testing.

The two primary lithological materials found at the Genesis Project site were classified by alteration type into six categories based on percent sulfide sulfur (SS) and percent carbonate carbon (CC) as shown in **Table B-1.**

TABLE B-1
Lithology and Alteration Classification

Lithology	Alteration Type	Sulfide Sulfur (%)	Carbonate Carbon (%)
Siliciclastic rocks	Oxidized siliceous (OS)	<0.2	--
Siliciclastic rocks	Unoxidized siliceous (US)	>0.2	--
Carbonate rocks	Oxide carbonate (OC)	<0.2	>0.5
Carbonate rocks	Unoxidized carbonate (UC)	<0.2	>0.5
Carbonate rocks	Oxide carbonate decalcified (OCD)	<0.2	<0.5
Carbonate rocks	Unoxidized carbonate decalcified (UCD)	>0.2	<0.5

Source: Geomega 2008c.

Genesis wall rock and waste rock from various lithologies, alteration types, depths, and locations were further classified following Newmont's standard net carbonate value (NCV) classification system, as shown in **Table B-2**. About 15,000 samples collected from 3,400 boreholes at the Genesis Project site were submitted for NCV analysis.

The NCV classification was used to describe exposed pit wall rock and backfill material to be placed in the Genesis and West Genesis pits. **Table B-3** shows the percentage of each type of material predicted to be exposed in the ultimate pit surface (UPS) or used as pit backfill. Based on the NCV classification, acidic and slightly acidic waste rock would comprise five percent of the proposed Genesis pit backfill and two percent of the West Genesis pit backfill for the Proposed Action. Acidic and slightly acidic mine pit wall rock that would be exposed for the Proposed Action and No Action alternatives are 14 and 11 percent, respectively, of the total pit wall surface.

TABLE B-2 Net Carbonate Value (NCV) Type Classification			
Code	**Classification**	**NCV Range (% CO_2)**	**Alteration Type**
1	Acidic	-5 < NCV ≤ -1	US, UCD
2	Slightly acidic	> -1 NCV ≤ -0.1	US, UCD
3	Inert/neutral	> -0.1 NCV < 0.1	US, OS, UCD
4	Slightly basic	≥ 0.1 NCV < 1	US, OS, UCD
5	Basic	≥ 1 NCV < 5	US, OS, OC
6	Highly basic	NCV ≥ 5	OC, OCD, UC

US = Unoxidized siliceous; UCD = Unoxidized carbonate decalcified; OS = Oxidized siliceous; OC = Oxide carbonate; OCD = Oxide carbonate decalcified; UC = Unoxidized carbonate.

TABLE B-3 Estimated Percentage of Mine Pit Wall Rock and Backfill by NCV Type					
Classification	**NCV Range (% CO_2)**	**No Action**	**Proposed Action**		
		Genesis Wall Rock (%)	**Genesis Wall Rock (%)**	**Genesis Backfill (%)**	**West Genesis Backfill (%)**
Acidic	-5 < NCV ≤ -1	8	9	3	1
Slightly acidic	> -1 NCV ≤ -0.1	3	5	2	1
Inert/neutral	> -0.1 NCV < 0.1	5	6	8	12
Slightly basic	≥ 0.1 NCV < 1	51	39	40	68
Basic	≥ 1 NCV < 5	8	5	12	16
Highly basic	NCV ≥ 5	25	36	35	2

NCV = Net Carbonate Value

Newmont performed multiple static and kinetic tests to evaluate and validate the NCV criteria applicable to identifying potentially acid generating (PAG) rock. Additional NCV testing of 187 individual and 34 single lithology composite samples, combined with Acid Base Accounting results (Acid Generation Potential – AGP; Acid Neutralization Potential – ANP; and Net Neutralization Potential – NNP) for the 34 composite samples, demonstrated that approximately 29 percent of wall rock and waste rock samples from the Genesis complex can be expected to meet Bureau of Land Management (BLM) guidelines for non-acid generating rock. Due to the uncertainty about potential acid generation for the remaining samples, additional kinetic testing was performed (Geomega 2008a).

Twenty humidity cell tests were performed on representative lithologies, and the observed acid generation potential was used to evaluate the NCV classification system. **Table B-4** provides test results for NCV, paste pH, MWMP, ABA, BAPP, Peroxide Acid Generation, field oxidation, and mineralogy (alteration type) which were compared to the final pH and net alkalinity from the humidity cell tests to determine the appropriate criteria for classification of PAG material. Prediction results were compared to net alkalinity from humidity cell tests because they reflect more conservative conditions than field oxidation tests and they better represent longer-term potential of fully oxygenated samples to generate acidity (Geomega 2008a).

Newmont's standard NCV classification system (**Table B-2**) was relatively good (90 percent accuracy) at predicting the acid generating potential of most Genesis waste rock samples, but the humidity cell test results did not fully confirm the NCV classifications for "slightly basic" (Code 4) or "inert/neutral" (Code 3) (Geomega 2008a). Specifically, composite samples 7 and 8 (Code 3 and 4, respectively) produced acidity during the humidity cell testing, while eight composite samples (5, 6, 11, 15, 16 19, 20 and 23) from Codes 3 and 4 did not produce acidity. The NCV data show 100 percent correlation for Codes 1 and 2 (PAG rock with NVC < -0.1 $\%CO_2$) and Codes 5 and 6 (non-PAG rock with NCV > 1.5 $\%CO_2$).

The addition of the paste pH predictor for samples where the paste pH ≥ 6 and NCV ≥ 0 $\%CO_2$ increases the predictive accuracy to 100 percent and was chosen over the other tests due to its ease of analysis. Comparison of the other tests to humidity cell net alkalinity showed the following predictive accuracies:

- MWMP based on sulfate minus net alkalinity being greater than 250 mg/L (100%)
- ABA NCV (80%)
- PAG pH (85%)
- BAPP pH (80%)
- NCV + PAG pH (90%)
- NCV + paste pH + PAG pH = MWMP (sulfate and alkalinity basis) (100%).

Using the NCV + paste pH classification system, material would be classified as PAG if one of the two following conditions occurs:

- NCV < 0 percent CO_2; or
- NCV ≥ 0 percent CO_2 and paste pH < 6.

Non-PAG material would be classified as follows:

- NCV ≥ 0 percent CO_2 and paste pH ≥ 6.

Based on this classification system and the Genesis plan of operations, a total of six percent waste rock (28 million tons) would be classified as PAG rock for the Proposed Action.

Table B-4. Comparison of Humidity Cell and Paste pH Test Results with Other Tests for Waste Rock for Genesis Composite Samples.

Waste Rock Composite ID	Location	Alteration Type	NCV Type	Static Test Results							Kinetic Test Results				
						Paste pH	MWMP	Acid-Base Accounting		Peroxide Acid Generation	BAPP	Humidity Cell Test Class		Field Oxidation Class after 26 months	
				NCV[a] (% CO_2)	NCV[b] (% CO_2)	pH (su)	Extract pH[c] (su)	NP/AP[a]	NCV[a] (ppt $CaCO_3$)	Final pH[d] (su)	Final pH[d] (su)	Final pH[c] (su)	Net Alkalinity[c] (mg/kg)	pH (su)	Net Alkalinity (mg/kg)
1	Bluestar	OC	Code 6	No	No	No	No	No	No	No	---	No	No		No
				12.41	13.9	8.84	8.24	no AP	282	8.42		7.11	801.63	7.36	1827
3	Genesis 2	OC	Code 5	No	No	No	No	No	No	No	No	No	No		No
				2.94	4.1	8.57	8.26	70.3	66.8	10.02	7.52	7.55	567.9	7.46	2170
4	Genesis 3	OC	Code 6	No	No	No	No	No	No	No	---	No	No		No
				13.9	15.9	8.63	8.32	no AP	314.8	7.93		7.98	786.26	7.31	2656
5	Bobcat	OCD	Code 3	Uncertain	Uncertain	No	No	Uncertain	Uncertain	No	No	No	No		No
				0.07	0	7.51	8.19	no AP	1.5	6.94	3.64	7.94	501.27	7.25	1828
6	Bobcat	OCD	Code 4	Uncertain	Uncertain	No	No	Uncertain	Uncertain	No	No	No	No		No
				0.26	0	7.28	8.11	no AP	5.8	7.44	3.66	7.46	692.52	7.26	1838
7	Genesis 1	OCD	Code 3	Uncertain	Uncertain	Yes	Yes	Uncertain	Uncertain	No	Yes	Yes	Yes		No
				0.06	0	5.66	7.4	no AP	1.3	4.67	3.43	4.45	-85.56	7.17	1080
8	Genesis 1	OCD	Code 4	Uncertain	Uncertain	Yes	Yes	Uncertain	Uncertain	No	Yes	Yes	Yes		No
				0.21	-0.1	5.3	7.18	no AP	4.7	4.81	3.46	3.79	-129.56	7.21	832
10	Genesis 2	OCD	Code 6	No	Uncertain	No	No	No	No	No	---	No	No		No
				5.22	0	8.07	8.79	no AP	118.6	7.88		7.61	743.8	7.63	2657
11	Genesis 3	OCD	Code 3	Uncertain	Uncertain	No	No	Uncertain	Uncertain	No	No	No	No		No
				0.05	-0.1	6.8	7.92	no AP	1.1	6.49	3.67	7.74	219.17	7.37	1470
15	Bobcat	OS	Code 3	Uncertain	Uncertain	No	No	Uncertain	Uncertain	No	No	No	No		No
				0.01	0	7.43	8.65	no AP	0.2	6	3.55	7.59	487.54	7.31	1552
16	Bobcat	OS	Code 3	Uncertain	Uncertain	No	No	Uncertain	Uncertain	No	No	No	No		No
				0	0	7.04	8.61	no AP	0	5.54	3.53	7.7	185.33	7.27	1332
19	Genesis 1	OS	Code 3	Uncertain	Uncertain	No	No	Uncertain	Uncertain	No	Yes	No	No		No
				0.05	0	7.01	8.54	1.9	1.2	4.89	3.48	7.84	146.31	7.25	1254
20	Genesis 1	OS	Code 3	Uncertain	Uncertain	No	No	Uncertain	Uncertain	No	No	No	No		No
				-0.07	-0.1	6.99	8.39	0.1	-1.6	5.34	3.59	7.83	333.32	7.24	1582
21	Genesis 1	OS	Code 5	No	Yes	No	No	No	No	No	No	No	No		No
				1.52	-0.2	7.2	8.31	9.6	34.7	5.75	3.73	7.02	179.17	7.46	1612
23	Genesis 2	OS	Code 4	Uncertain	Uncertain	No	No	Uncertain	Uncertain	No	No	No	No		No
				0.32	0.3	7.47	8.67	no AP	7.3	7.67	3.58	7.22	707.17	7.36	1650

Table B-4. Comparison of Humidity Cell and Paste pH Test Results with Other Tests for Waste Rock for Genesis Composite Samples.															
				Static Test Results							Kinetic Test Results				
						Paste pH	MWMP	Acid-Base Accounting		Peroxide Acid Generation	BAPP	Humidity Cell Test Class		Field Oxidation Class after 26 months	
Waste Rock Composite ID	Location	Alteration Type	NCV Type	NCV[a] (% CO_2)	NCV[b] (% CO_2)	pH (su)	Extract pH[c] (su)	NP/AP[a]	NCV[a] (ppt $CaCO_3$)	Final pH[d] (su)	Final pH[d] (su)	Final pH[c] (su)	Net Alkalinity[c] (mg/kg)	pH (su)	Net Alkalinity (mg/kg)
26	Genesis 1/3	UCD	Code 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
				-1.85	-1.5	4.11	3	0	-42.1	2.44	2.2	2.24	-11648.86	5.26	-3771
27	Genesis 1	UCD	Code 2	Yes	Yes	Yes	Yes	Uncertain	Uncertain	Yes	Yes	Yes	Yes		No
				-0.54	-0.4	4.68	4.75	0.1	-12.4	3.25	3.3	2.81	-803.2	6.92	443
30	Genesis 1	US	Code 1	Yes	Yes	No	Yes	Uncertain	Yes	Yes	Yes	Yes	Yes		No
				-1.75	-0.5	6.1	6.48	0.1	-39.7	2.42	2.22	2.33	-3361.64	6.72	368
31	Genesis 1	US	Code 2	Yes	Uncertain	No	Yes	Uncertain	Uncertain	Yes	Yes	Yes	Yes		No
				-0.44	0.4	6.8	7.61	0.6	-10	2.89	3.48	2.62	-1009.49	7.07	735
34	Genesis 1	US	Code 5	No	No	No	No	No	No	Yes	Yes	No	No		No
				2.41	0.9	6.99	7.53	3.2	54.7	3.32	3.43	6.66	181.34	7.12	1203

[a]Newmont Metallurgical Services

[b]SVL Analytical Inc.using a modified Sobek method with a Hot DI Water Rinse

[c]McClelland Laboratories Inc.

[d]Little Bear Laboratories Inc.

NOTES:

Alteration types: OS (oxide siliceous), US (unoxidized siliceous), OC (oxide carbonate), OCD (oxide carbonate decalcified), UC (unoxidized carbonate), UCD (unoxidized carbonate decalcified). See Table B-2 for NCV Type descriptions.

NP = Neutralization Potential; AP = Acidification Potential; NNP = Net Neutralization Potential; NCV = Net Carbonate Value; MWMP = Meteoric Water Mobility Procedure; BAPP = Biological Acid Production Potential;

su = standard units; ppt = parts per thousand; TCaCO3/k = tons calcium carbonate per kiloton; %CO2 = percent carbon dioxide; mg/kg = milligrams per kilogram. "---" = not tested.

"Yes" = Yes for acid generating potential (cells are shaded); "No" = No for acid generation potential; "Uncertain" = uncertain acid generation potential.

Composite IDs are shaded when the NCV < 0 or the NCV ≥ 0 and paste pH < 6 criteria predicts acid generation.

The following criteria are used to determine "Yes", "No", and "Uncertain":

NP:AP --- "Yes" = 0; "No" > 3; "Uncertain" > 0 and ≤ 3.

NNP --- "Yes" < -20; "No" > +20; "Uncertain" ≥ -20 aNod ≤ +20.

NCV --- "Yes" NCV < -0.1; "Uncertain" -0.1 ≥ NCV <0.9; No" NCV ≥ 0.9.

MWMP --- MWMP extract pH is "Yes" if the Sulfate - Net alkalinity > 250 mg/L.

Peroxide Acid Generation --- "Yes" <4.5; "No" ≥ 4.5.

Paste pH --- "Yes" < 6.0; "No" ≥ 6.0.

Humidity Cell --- "Yes" pH < 5.0 or net alkalinity <0; "No" pH ≥ 5.0 or net alkalinity ≥ 0.

BAPP --- "Yes" < 3.5; "No" ≥ 3.5. Note: False Positive test if PAG pH is >4.5.

Field Oxidation Tests --- "Yes" net alkalinity <0; "No" net alkalinity ≥ 0.

Source: Geomega 2008a (Modified from Table 4-10 of Newmont Genesis Project, Characterization of Wall Rock and Waste Rock Chemistry)

NO ACTION ALTERNATIVE

The geochemical characterization and modeling conducted under the No Action alternative assumed no expansion or backfilling of the existing Genesis pit. Objectives of the study include:

- Predict chemistry of Genesis pit lake water;
- Assess potential future impacts to groundwater adjacent to the pit; and
- Identify potential effects to human health and/or biota.

Hydrologic Inputs to Pit Lake

Water inflows and outflows associated with the Genesis pit are expected to come from the following sources:

- Meteoric precipitation (rain and snow) falling on the pit lake surface;
- Surface runoff from pit walls (incident precipitation);
- Groundwater flow through the pit walls; and
- Evaporation.

It was assumed for the model that surface runoff from outside the Genesis pit would be collected by storm water diversion systems and diverted around the pit. A schematic showing various components of the water balance is shown on **Figure B-1**.

Since 1990, Newmont has contracted with Hydrologic Consultants, Inc. (HCI) to develop, maintain, and update a numerical model that simulates groundwater flow in the northern Carlin Trend (i.e., Carlin Trend Model) (HCI 2007). The Carlin Trend Model provides predicted groundwater fluxes into and out of the Genesis pit lake for the chemical modeling conducted by Geomega (2008b). Meteoric precipitation (11.5 in/yr) and evaporation (45.5 in/yr) used in the model were also provided from the HCI (2007) model. Surface water runoff from the pit walls was excluded from model simulation because the volume of water from this source was considered negligible to the water balance and pit lake chemistry (Geomega 2008b). This was consistent with assumptions by HCI (2007) that pit wall runoff was negligible in the context of the entire pit lake water balance. While the total contribution of water volume from this source may be negligible, the solute loading associated with wall rock leaching for hundreds of years could influence overall pit lake chemistry and is addressed later in this appendix.

Chemical mass entering the Genesis pit lake is derived from the solutes dissolved in background groundwater, and solutes leached from the oxidized rind of the pit walls as incoming groundwater passes through the rind and enters the pit (**Figure B-1**). Background groundwater chemistry was defined by groundwater data collected at monitoring well GEN-39 (**Table B-5**), which is located within the current Genesis pit (Geomega 2008b). Well GEN-39 was selected to represent background groundwater because: (1) the well is completed in a mineralized zone of the Genesis pit; and (2) Genesis pit infilling will come mostly from carbonate rocks of the same formation (Geomega 2008b; HCI 2007).

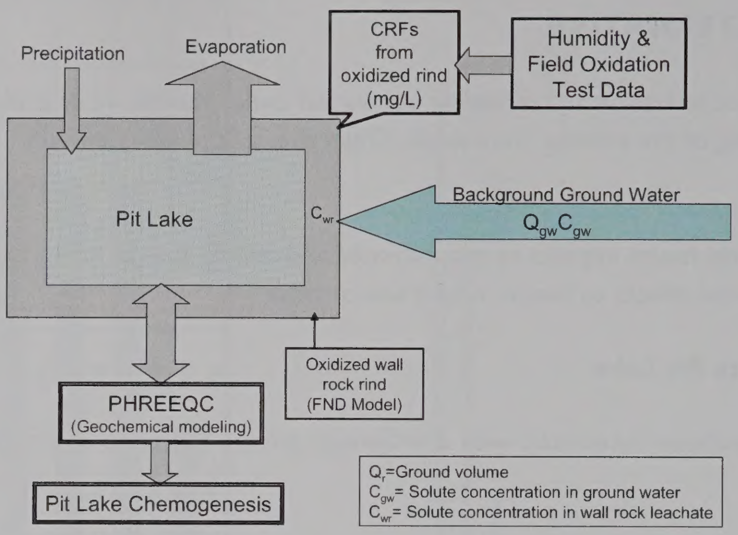


Figure B-1. Schematic of Pit Lake Modeling Components for No Action Alternative

Chemical inputs used to predict the contribution of wall rock leachate to chemical mass loading were derived from humidity cell and field oxidation tests, calculated chemical release functions (CRFs), and the Fennemore-Neller-Davis (FND) pyrite oxidation model (**Figure B-1**).

Humidity Cell and Field Oxidation Testing

From 533 rock samples, 34 composite samples were established. From this set of composite samples, 20 samples representing all NCV types were selected and used in the humidity and field oxidation testing to evaluate the rate of pyrite oxidation and leaching behavior of metals and major ions.

Chemical Release Functions

The mass flux of any given constituent to groundwater passing through the oxidized rind of the Genesis pit walls is defined by the chemical release functions and the thickness of the wall rock oxidation rind (**Figure B-1**). Chemical release functions are empirically derived from curves fit to pore volume versus solute release data obtained from humidity cell and field oxidation testing (Geomega 2008b).

Oxidation Modeling

The extent of wall rock oxidation was estimated using the FND pyrite oxidation model (Fennemore *et al.* 1998). The FND model simulates sulfide oxidation reactions based on transport of oxygen and water within each NCV type, accounting for enhanced oxidation rates due to the presence of macrofractures in the pit walls. The FND model uses site-specific input parameters including wall rock fracture density, wall rock particle size, rock porosity, wall rock pyrite density, mass of oxygen per mass of sulfur consumed, wall rock thickness, oxygen diffusion rate through pore space, and oxygen diffusion rate through particles to estimate the thickness of wall rock oxidation rind and, thereby, the mass of wall rock contributing solute mass.

TABLE B-5
Predicted Genesis Pit Lake Chemistry for Maximum Concentrations

Parameter	Concentration in milligrams per liter (mg/L) unless otherwise noted			
	Influent Groundwater Chemistry[1]	Predicted Final Chemistry of Pit Lake using Field Oxidation Test Results[2]	Predicted Final Chemistry of Pit Lake using Humidity Cell Test Results[3]	Nevada Municipal or Domestic Supply Standards[4]
Alkalinity	135.0	426.1	418.0	NS
Aluminum	<0.037	0.085	0.083	NS (0.05*)
Antimony	0.009	0.079	0.079	0.146 (0.006*)
Arsenic	0.400	2.921	2.942	0.05 (0.01*)
Boron	0.08	0.66	0.90	NS
Barium	0.06	0.017	0.017	2.0
Beryllium	<0.002	0.007	0.007	0.004
Calcium	39.20	7.14	7.37	NS
Cadmium	<0.002	<0.002	<0.002	0.005
Chloride	26.0	190.4	190.3	250
Chromium	<0.008	0.042	0.043	0.1
Copper	<0.004	0.035	0.036	NS (1.3*)
Fluoride	0.40	3.14	3.13	NS (4.0*)
Iron	<0.019	<0.019	<0.019	NS (0.3*)
Lead	<0.002	0.013	0.013	0.05 (0.015*)
Mercury	<0.0002	0.0012	0.0012	0.002
Magnesium	15.5	112.6	112.6	NS
Manganese	0.05	<0.05	<0.05	NS (0.05*)
Nickel	<0.016	0.606	0.606	0.0134
Nitrate-N	0.52	4.09	4.07	10
pH (std. units)	7.99	8.65	8.64	5.0-9.0 (6.5-8.5*)
Potassium	3.00	22.62	22.56	NS
Selenium	<0.048	0.181	0.181	0.05
Silver	<0.005	0.028	0.030	NS (0.1*)
Sodium	29.5	215.7	215.7	NS
Sulfate	47.0	342.2	342.1	250
Thallium	0.003	0.026	0.026	0.013 (0.002*)
Zinc	<0.004	0.036	0.044	NS (5.0*)

[1]Chemistry from Groundwater Monitoring Well GEN-39. Shaded cells exceed at least one of the water quality standards in the last column. Source: Geomega 2008b.

[2]Concentrations based on modeling using chemical release functions based on 12-month field oxidation test results; these are maximum concentrations after 436 years of groundwater recovery, except for barium and calcium which are based on 25 years of infilling. Shaded cells exceed at least one of the water quality standards in the last column. Source: Geomega 2008b.

[3]Concentrations based on modeling using chemical release functions based on humidity cell test results; these are maximum concentrations after 436 years of groundwater recovery, except for barium and calcium which are based on 25 years of infilling. Shaded cells exceed at least one of the water quality standards in the last column. Source: Geomega 2008b.

[4]NS = no standard. State water quality standards are from Nevada Administrative Code 445A.144. Values with an asterisk (*) are federal primary or secondary drinking water standards from 40 CFR Parts 141 & 143.

Pit Lake Modeling

In the pit lake model, influent water from all sources and the respective chemical masses are proportionally mixed with the existing volume of water in the pit lake from the previous year. Effluent from evaporation is removed as pure water. The resulting solution composition is imported into the geochemical model PHREEQC (**Figure B-1**) which allows for equilibration of the solution with atmospheric gases and potential and/or existing solid phases, and simulation of adsorption reactions involving amorphous ferric hydroxide (AFH).

Solubility controls or equilibrium phases incorporated into the geochemical model include carbon dioxide (CO_2), oxygen (O_2), barite ($BaSO_4$), calcite ($CaCO_3$), ferrihydrite ($Fe(OH)_3$), gibbsite ($Al(OH)_3$), gypsum ($CaSO_4$), manganite ($MnO(OH)$), and otavite ($CdCO_3$).

Pit Lake Modeling Results for No Action Alternative

Groundwater modeling (HCI 2007a) predicts that the Genesis pit lake will begin to form approximately 113 years after dewatering ceases at the Leeville Mine in year 2018, and that infilling will start in about year 2130 and be 90 percent complete within the first 216 years, with complete filling after 436 years. The model predicts the Genesis pit lake will evolve to an alkaline lake (pH ~ 8.6) and contain some chemical constituents above state and/or federal drinking water standards (**Table B-5**). The drinking water standards are used only for comparative purposes as groundwater in the Project area is not used for drinking. The following constituents in influent groundwater exceed drinking water standards (**Table B-5**):

- Antimony
- Arsenic
- Thallium

The following constituents are predicted to exceed drinking water standards for modeled maximum concentrations in the final pit lake (all of which would occur after 436 years of groundwater recovery, except for barium and calcium, which would reach maximum concentrations after 25 years recovery) (**Table B-5**):

- Aluminum
- Antimony
- Arsenic
- Beryllium
- Nickel
- Selenium
- Thallium
- Sulfate
- pH

The Genesis pit lake would be a terminal lake during groundwater recovery and, therefore, most constituent concentrations would increase with time due to the effects of evapoconcentration. Model results indicate there would be a small amount of groundwater throughflow (1 to 2 gal/min) after the pit

lake reaches steady-state conditions (HCI 2007a). This low rate of groundwater flux is well within the margin of error of model results and is a minor percentage of regional groundwater flow; therefore, the modeled throughflow condition at the Genesis pit may not occur (HCI 2007a). The groundwater throughflow condition is based on model results where regional groundwater would flow from the Genesis Project area toward the Betze/Post-Meikle mine area where water levels are predicted to be approximately 20 feet lower than at the Genesis Project area.

Model results using humidity cell or field oxidation test data as chemical inputs were similar due to the dominant contribution from groundwater (**Table B-5**). Removal of constituents via adsorption to amorphous ferric hydroxide was predicted to be minimal because of the low influent flux of iron. The model predicted precipitation of barite, calcite, and otavite, which controlled the concentrations of barium, calcium, and cadmium, resulting in a decreasing concentration trend for these elements. These results and conclusions are consistent with other pit lake modeling studies for lakes that form in carbonate buffered systems (Eary 1998).

Because the Genesis pit lake is predicted to be a sink for at least 400 years, it is unlikely there would be adverse impacts from the lake on adjacent groundwater. However, the creation of a large, open water body with elevated levels of numerous chemical constituents, including metals, could pose a risk to both human health and biota. As noted above under the *Hydrologic Inputs to Pit Lake* section, omission of wall rock runoff as a source of chemical mass loading could bias the prediction of water quality, resulting in an underestimation of solute concentrations. This omission however, does not affect the primary conclusions of the modeling that the pit lake will evolve to contain some constituents above background groundwater quality and above state and/or federal drinking water standards.

PROPOSED ACTION ALTERNATIVE

The Proposed Action for the Genesis project would deepen and expand the Genesis pit, create a smaller pit immediately west of the Genesis pit (West Genesis), and backfill a portion of both pits with waste rock. The bottom elevation of the Genesis and West Genesis pits are planned to be 4640 and 4829 feet above mean sea level (amsl), respectively. The Genesis and West Genesis pits would be backfilled primarily with non-PAG waste rock. Any PAG waste rock would be isolated in "cells" above an elevation of 5370 feet amsl which is above the pre-mining groundwater level of 5267 feet amsl. Dewatering associated with mining at Meikle, Betze/Post, and Leeville will lower the water table >1,100 feet below the base of the Proposed Action Genesis Pit by year 2018, and backfill in the Genesis pit is not expected to begin refilling with groundwater until year 2054. The lower portion of the Genesis and West Genesis pits (below 5225 feet amsl) will eventually become inundated with groundwater after mine dewatering activities cease.

Newmont and Geomega evaluated the following: (1) potential impacts to groundwater resulting from placement of waste rock into the deepened and expanded pits, which would eventually become inundated with groundwater; and (2) potential impacts to groundwater from placement of waste rock in dry pits and waste rock disposal facilities at ground surface.

A combination of numerical models including unsaturated zone, saturated flow, oxidation, geochemical, and transport modeling were coupled to evaluate potential impacts from solute loading under the Proposed Action (i.e., changes to existing mine plan) to groundwater in and near the Genesis Project area. Two numerical models were employed:

- HYDRUS 1D – quantify infiltration through waste rock disposal facilities and backfilled pits under unsaturated conditions, and assess the efficacy of cover materials placed over the backfill.
- MODFLOW-SURFACT – evaluate chemical fate and transport under variable saturated and completely saturated conditions.

Numerical model inputs and outputs were supported with oxidation modeling (Davis-Ritchie), geochemical modeling (PHREEQC), and additional geochemical data from batch tests (Geomega 2008a, 2008c).

As was the case in the pit lake model, groundwater quality will depend on chemical mass loading to water moving through the waste material. **Figure B-2** is a schematic diagram of hydrologic and geochemical components of the modeling. These generalized components are used to develop modeling of pit backfill and waste rock disposal facilities.

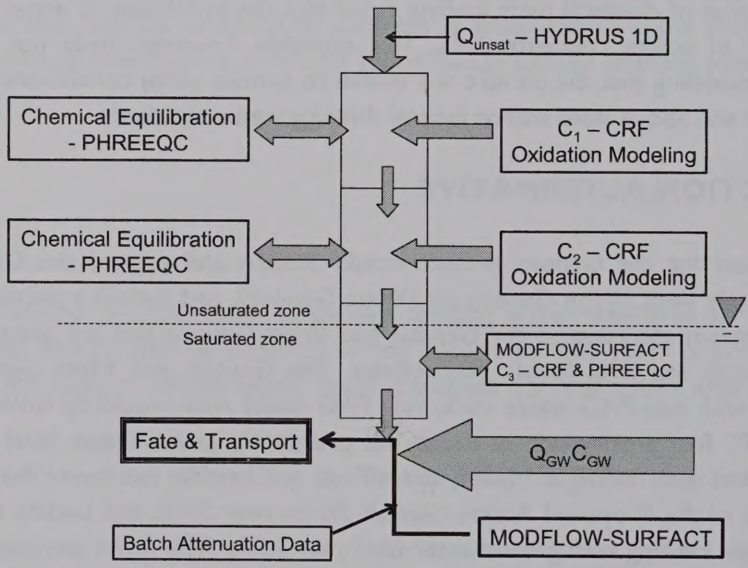


Figure B-2. Schematic of Waste Rock Modeling Components for Proposed Action

Unsaturated Zone Loading Modeling

Unsaturated zone modeling was conducted to quantify the amount and timing of infiltration through the backfill materials and to assess the effects of reduced infiltration resulting from placement of a cover on top of the backfill. Results from the unsaturated zone modeling are used as inputs to both the local-scale groundwater model and the geochemical models to predict chemical mass loading during the period when backfilled waste rock is unsaturated.

HYDRUS-1D Modeling

As shown in **Figure B-2**, water flux into each cell in the unsaturated zone is estimated with HYDRUS-1D. Details of the hydrologic input parameters used for the Hydrus modeling are provided by Geomega (2008c). To simulate unsaturated flow through backfill, a one-dimensional soil column with a total depth of 730 feet was created to represent the thickest backfill profile; then observation points were specified at several depths to evaluate infiltration within the backfill. Additional simulations were also performed to evaluate the effect of placing a capillary cover over the backfill.

The model domain was given an atmospheric boundary condition with ponding for the upper boundary, and a free drainage or unit gradient boundary ($dh/dz = 0$) for the lower boundary condition. The moisture content at initial conditions was set slightly above the residual moisture content for each material type. Model simulations were initially run for a 35-year period, and then for an additional 35 years using the final water content within the soil profile from the initial run. In cases where breakthrough was not achieved during the 70-year simulation, additional periods were simulated to achieve breakthrough at the bottom of the soil profile. To evaluate the sensitivity of unsaturated soil hydraulic parameters, four different soil profiles were evaluated, including compacted waste rock, waste rock in the middle of lift, waste rock in the bottom of lift, and coarse waste rock.

Two additional simulations (compacted waste rock and coarse waste rock) were performed to evaluate the performance of a capillary cover emplaced on the top of the backfill profile. The capillary cover was parameterized based on native soil in the vicinity of the study area, where the dominant soil is of the Bucan-Humdum Association, which varies from silt loam to clay. The cover simulations considered two feet of native soil cover underlain by one foot of coarse waste rock, with backfill material below the coarse waste rock.

Hydrus 1-D Results

A total of six simulations were performed with four different waste rock profiles and the two end-member profiles with two feet of native soil cover. Simulations were run until breakthrough occurred at the bottom of the waste rock profile and seepage or flux rates reached a pseudo-steady-state. Results ranged from a relatively rapid breakthrough of 8.4 years in the coarse waste rock profile, to 187 years in the compacted waste rock profile with cover (Geomega 2008c). Steady-state seepage rates varied from 0.07 ft/year in the compacted waste rock profile with cover, to 0.67 ft/year in the coarse waste rock profile. These steady-state seepage rates calculated at the bottom of the backfill column range from 8 to 67 percent of annual precipitation; annual precipitation in the vicinity of the backfill is approximately one ft/year. The breakthrough curves for waste rock exhibit an oscillatory behavior once breakthrough has occurred, which is indicative of moisture fronts derived from large storm (and infiltration) events. Pulses of moisture act as the driving force for deeper, unsaturated water movement, and similar patterns are apparent for the moisture content profile (Geomega 2008c).

Profiles with the highest saturated hydraulic conductivities resulted in the fastest breakthrough times and the highest steady-state water seepage rates. The backfill never becomes fully saturated for any material type and not more than 30 percent saturated throughout the simulation for the middle of lift waste rock properties (Geomega 2008c). Comparison of the two cover scenarios indicates that the two end-member soil profiles (compacted waste rock vs. coarse waste rock) with a two-foot native soil

cover yielded similar steady-state seepage rates, within 0.01 ft/year. However, the simulations differ in breakthrough time, due to different properties of the underlying waste rock profiles. Soil cover simulations reduced infiltration of precipitation by 83 percent for the compacted waste rock and by 88 percent for the coarse waste rock profile. These results highlight the importance of adequate parameterization for soil at or near the surface. Once water infiltrates beyond the depth available for potential evaporation, it will be retained initially as soil storage, but will eventually infiltrate through the waste rock profile and recharge groundwater.

Oxidation Modeling

Blasting, excavation, and translocation activities during open pit mining will result in the exposure of mineralized rock to the atmosphere. Sulfide minerals such as pyrite, stable under reducing conditions, may oxidize and leach solutes when exposed to the atmosphere (oxygen) and water. In the backfilled waste rock placement, as sulfide oxidation in shallow portions of the backfill becomes diminished, oxygen migrates farther down into the backfill profile, leading to propagation of the oxidation reaction front. However, the advancement of this front is primarily limited by the rate of oxygen diffusion through pore spaces and within waste particles (Davis and Ritchie 1986).

In environments with high permeability (such as backfill waste rock), other transport processes (e.g., convection and advection) can also be significant (Geomega 2008c). Diffusion, advection, and convection transport processes are significantly affected by the moisture content of waste materials, and oxygen transport under water-filled porosity (saturated conditions) is inhibited (Geomega 2008c). Under saturated conditions, groundwater flow rates and oxygen content determine the advancement of the oxidation front. Propagation of the oxidation front will also be affected by the rate of oxygen consumption (i.e., rate of sulfide oxidation) and the availability of sulfide minerals (Geomega 2008c).

The waste rock proportion based on the NCV classification (Codes 1 to 6) for each mining stage was used to construct a NCV spatial distribution of Genesis waste rock associated with the current mine plan. For waste rock containing more than one NCV type, a probability function was used to assign the NCV type for each model cell. The north-south cross-section through the Genesis backfilled waste materials was then used to select representative PAG and non-PAG vertical columns in the oxidation simulations. These vertical columns were chosen because they contained relatively more vertical model cells in the cross-section (seven and eight layers for PAG and non-PAG, respectively), and represented the waste rock proportion in the Genesis backfilled materials. The simulations were conducted using a modification of the Davis-Ritchie approach (Davis and Ritchie 1986) to account for oxygen diffusion, advection, and convection terms. The input parameters used in the oxidation modeling are presented by Geomega (2008c). The oxidation model utilized a cell discretization of 100 x 100 x 3.28 feet for each cell or layer. The oxidation and geochemical model for the Beast Waste Rock Disposal Facility was simulated using a cell discretization of 18 x 3.28 x 3.28 feet (5.5 x 1 x 1 meters).

Samples with particle size <6.3 millimeters (mm) (80% <2 mm) and <2.4 mm were used in the humidity cell and field oxidation tests, respectively. These particle sizes are generally much smaller than the rocks that comprise the bulk of the waste rock. However, smaller particles are more reactive in terms of oxidation kinetics and were, therefore, included because they provide a conservative upper boundary in

defining waste rock oxidation and chemical mass loading algorithms. Chemical input in each cell is defined by the chemical release function for each NCV type from humidity cell and field oxidation test data, in combination with oxidation modeling.

Oxidation Modeling Results

Sulfide oxidation rates for each cell or layer in the PAG and non-PAG columns generally show similar trends using both humidity cell and field oxidation. The upper two or three layers in the PAG and non-PAG columns were completely oxidized, while the subsequent layers remained unoxidized due to limited oxygen transport into deeper layers (Geomega 2008c).

In the modeled PAG column, sulfide oxidation in the top layer reached 99 percent after 64 and 138 years using humidity cell and field oxidation data, respectively. For the second layer, sulfide oxidation reached approximately 30 percent after 425 years, using both humidity cell and field oxidation data. For the third layer, sulfide was not oxidized or only reached 6 percent after 425 years, using humidity cell and field oxidation data, respectively. Sulfide in the subsequent deeper layers (layers 7, 8, 9, and 10) remained unoxidized.

In the modeled non-PAG column, sulfide oxidation in the top layer reached 99 percent at 194 and 104 years using humidity cell and field oxidation data, respectively. For the second layer, sulfide oxidation reached 99 percent after 334 and 298 years using both humidity cell and field oxidation data, respectively. For the third layer, sulfide oxidation reached ~99 percent after 335 and 425 years, using humidity cell and field oxidation data, respectively. For the fourth layer, sulfide was not oxidized or reached 8 percent after 425 years with field oxidation and humidity cell data, respectively. Sulfide oxidation in the subsequent deeper layers (layers 9, 10, 11, and 12) remained unoxidized.

Waste Rock Chemistry Modeling

Potential impacts from solute transport mechanisms were evaluated with an aqueous geochemical model (PHREEQC) that utilized time- and space-varying water fluxes from the numerical vadose zone flow and groundwater flow models (Geomega 2008c). PHREEQC was used to evaluate the effects of geochemical transformation processes along the transport path, to provide estimates of water quality and quantity expected to discharge from the selected PAG and non-PAG waste rock columns, and ultimately the backfilled waste rock. Waste rock chemistry modeling simulated geochemical transformations anticipated to occur in the backfilled waste rock within each layer of the two selected reaction columns (PAG and non-PAG) over 425 years.

Unsaturated Zone Modeling Results

Solute loading from waste rock material was incorporated into the linked oxidation and geochemical models using site-specific, empirically derived chemical release functions. The chemical release functions represent concentrations of each solute as a function of oxidation, derived from a plot of the oxidized percent of sulfide (e.g., sulfate released in the humidity cell or field oxidation tests divided by sulfide content in the associated sample) versus the concentration of each constituent released per kilogram rock. Seepage and flux of water into each cell through the vadose zone was simulated with HYDRUS-1D and linked to the oxidation model and PHREEQC to simulate geochemical evolution (e.g., leaching,

precipitation, oxidation, complexation, and sorption) along the flow path through the backfilled waste rock (**Figure B-2**). Equilibrium phases incorporated into the PHREEQC geochemical model include iron (Fe), aluminum (Al), iron-arsenic (Fe-As), and manganese (Mn) oxides/oxyhydroxides (ferrihydrite, gibbsite, scorodite, manganite, bixbyite); copper (Cu), nickel (Ni), thallium (Tl), zinc (Zn), and cadmium (Cd) hydroxide; secondary calcite ($CaCO_3$); fluorite (CaF_2); gypsum/anhydrite ($CaSO_4)(2H_2O)$ or $CaSO_4$); epsomite ($MgSO_4$); barite ($BaSO_4$); jarosite-K ($KFe_3(SO_4)_2(OH)_6$); and alunite ($KAl_3(SO_4)_2(OH)_6$). Results for individual cells were used as input into the coupled Saturation Zone Model described below to estimate constituent loading to groundwater.

Saturated Zone Modeling

Initial water volumes, flows, recharge, and material porosities were taken from the groundwater flow modeling inputs and results described previously under the No Action scenario. The flux of water into each cell through the vadose zone or local groundwater was simulated with MODFLOW. The saturated zone model was coupled to the results from the unsaturated zone model both with and without chemical attenuation based on the batch attenuation results presented below. Details on the coupling of the various models are presented by Geomega (2008c).

Batch Attenuation Testing

The waste rock disposal facilities and/or pit backfill at the Genesis Project would be placed atop the carbonaceous Roberts Mountain Formation and, therefore, water exiting the bottom of the PAG cells would infiltrate through the carbonate-rich material. To supplement initial waste rock characterization and assess potential natural attenuation of solutes in the vadose and groundwater systems, batch tests using site-derived materials were conducted to determine partition coefficients. Groundwater from Leeville well HDDW-10, spiked with a known concentration of multiple solutes, was mixed and equilibrated with a known quantity of carbonate rock representative of rock beneath and downgradient of the Genesis pit. After a 24-hour equilibration period, the batch water was separated from the solids and analyzed to determine the fraction of each element in solution (EPA 1999).

Results of Batch Tests

Batch test results show that most of the elements tested including arsenic, cadmium, lead, silver, mercury, antimony, chromium, copper, nickel, and zinc were sorbed by the bedrock carbonate. Freundlich and Langmuir isotherms were used to calculate partition (attenuation) coefficients (K_d) for arsenic, antimony, and mercury for input to the groundwater transport model (Geomega 2008c). For cadmium, lead, chromium, copper, silver, thallium, nickel, selenium, manganese, and zinc, the test results indicate that the carbonate bedrock contained considerable attenuation capacity for these metals. However, most results could not be described using either the Freundlich or Langmuir isotherms, and attenuation of these elements was not modeled. Boron was only slightly adsorbed (0 to ~ 20%) by bedrock material.

Predicted Chemistry of Groundwater from Mine Pit Backfill for Proposed Action

Chemical composition of water flowing through mine pit backfill was simulated over a period of 425 years. Impacts to groundwater were evaluated under two scenarios: one in which attenuation of solutes was not invoked, and the second in which attenuation for parameters derived from batch testing was applied. Modeling with no attenuation predicted that the behavior of solutes could be grouped into three general categories:

- Solutes dominated by the oxidation or leaching trend: arsenic, antimony, boron, cadmium, chromium, fluoride, lead, magnesium, manganese, mercury, nickel, nitrate, potassium, selenium, silver, sodium, sulfate, thallium, and zinc.
- Solutes reported to be controlled by equilibration with solid phases: alkalinity, aluminum, barium, calcium, copper, and iron.
- Solutes controlled by background water concentrations: chloride.

Predicted waste rock pore water at the base of the modeled PAG and non-PAG columns is neutral to slightly basic, with pH values ranging from about 6.5 to 8.0 standard units.

Solute concentrations in the PAG columns for constituents in the first group listed above were above background groundwater concentrations during vadose zone loading, but were predicted to generally decrease to concentrations close to those associated with background groundwater (represented by well GEN-39) after groundwater rebound infiltrates the pit and dilutes the pore water. Concentrations for constituents in the second group listed above were controlled by precipitation of solid phases that included gibbsite, ferrihydrite, secondary calcite, and barite. Precipitation of these phases is expected under neutral pH and oxidizing conditions. In summary, solute chemistry predicted to discharge from the base of the selected PAG and non-PAG columns in the Genesis pit would be neutral to slightly basic, and generally exceed background water quality. Solute concentrations simulated using humidity cell data generally release higher concentrations than those calibrated using field oxidation data.

As the water table rebounds, the chemical mass released during vadose loading would enter the groundwater system. Upon saturation by recovering groundwater, the predicted groundwater chemistry was applied to the local-scale MODFLOW model to simulate transport away from the backfilled pit, to potential receptors. The predicted chemistry was applied to waste rock cells in the groundwater model as a plane, once the layer becomes saturated. Waste rock cells were assigned concentrations representative of either PAG or non-PAG leachate chemistry, depending on their position relative to their deposition according to the mine plan. The backfilled Genesis and West Genesis pits were treated as a solute source during the simulation, where the solutes predicted from geochemical modeling were applied as prescribed concentration boundary conditions in the transport model. Concentrations of 28 solutes were monitored along the primary flow directions using hypothetical multilevel observation wells at the north and south ends of the model domain.

Groundwater quality predicted by the modeling was compared to water quality measured at Well DS-66. Well DS-66 is screened in the lower plate carbonates, immediately downgradient from the Genesis pit. **Table B-6** lists the concentration of 28 solutes in groundwater measured at DS-66, and the maximum predicted solute concentrations, in any model layer, for the entire simulation. Fourteen of the

28 solutes evaluated in this investigation were either not analyzed or not detected at DS-66, including aluminum, boron, cadmium, chromium, copper, lead, mercury, nickel, phosphorous, tin, selenium, silver, thallium, and zinc. Eleven of the remaining 14 solutes exceed the measured solute concentrations at DS-66, at either the north or south monitoring location, for a portion of the simulation period, including alkalinity, calcium, chloride, fluoride, iron, magnesium, manganese, nitrogen, potassium, sodium, and sulfate. However, at the end of the simulation, predicted concentrations of potassium and sodium fall below those measured at DS-66. Due to dilution by background water and attenuation, transport of arsenic and barium is limited and these constituents never exceed the solute concentrations measured at DS-66, at either the north or south monitoring locations during the entire simulation period.

Predicted Chemistry of Groundwater from Waste Rock Disposal Facilities for Proposed Action

Modeling was also conducted to predict the fate of solutes that might be leached from waste rock disposal facilities constructed above ground surface. Leachate exiting the base of waste rock piles would travel several hundred feet through unsaturated carbonate-rich bedrock before mixing with the recovered groundwater table.

Model results for the waste rock disposal facilities also predict that some constituents would be elevated at the base of the waste rock pile. Predicted pH values are in the range of 7.4 to 8.0 standard units for solute discharging from the base after initial interaction with the carbonate bedrock (i.e., calcite). Predicted concentrations for arsenic, antimony, and mercury in leachate leaving the PAG cells are approximately 40, 12, and 0.05 mg/L, respectively, all of which exceed drinking water standards for groundwater. After reacting with calcite at the base of the waste rock disposal facility, constituent behavior, similar to that predicted for pit backfill, can be grouped into two general categories:

- Solutes dominated by the oxidation or leaching trend.
- Solutes controlled by equilibration with solid phases.

Analytes included in the first group listed above are: antimony, arsenic, boron, cadmium, chloride, chromium, fluoride, magnesium, mercury, nitrate, potassium, selenium, silver, sodium, sulfate, and zinc. These elements showed increasing concentrations over time, associated with maximum oxidation/leaching of the top several layers of waste rock. Solutes in the second group are primarily influenced by precipitation/dissolution of equilibrium phases and/or adsorption to precipitated solids and/or bedrock. The solutes influenced by mineral precipitation or sorption include alkalinity, aluminum, barium, calcium, copper, iron, lead, manganese, nickel, and thallium. In the simulated results, ferrihydrite, gypsum, gibbsite, bixbyite, fluorite, barite, $Cu(OH)_2$, $Tl(OH)_3$, and $Ni(OH)_2$ were precipitated.

Batch tests showed that the Roberts Mountains carbonate rock that would be present beneath the waste rock disposal facilities acts as an attenuator for some dissolved metals and other constituents. For those constituents that follow Freundlich sorption isotherms, and could be assigned a distribution coefficient (e.g., arsenic, mercury, and antimony), the predicted vadose zone pore water concentrations are negligible within the first 100 to 200 feet of carbonate rock. Therefore, the Geomega (2008c) analysis predicts no potential impacts to groundwater from any of the simulated solutes. Other metals (with the exception of boron) that did not follow sorption isotherms in the batch testing showed near-total sorption onto the carbonate rock and, therefore, may also be rapidly attenuated.

Table B-6. Summary of Predicted Potential Impacts to Groundwater Quality

Parameter	Groundwater Quality Well DS-66[1]	Max. Predicted Conc. in Groundwater for Entire Simulation	Solute Plume Behavior[2]	Attenuation Invoked[3]	Percent Mass Attenuated[4]	Max. Conc. Tested[5]
Silver	<0.005	0.014	-	N	67 - 96	0.06
Aluminum	<0.1	0.028	-	N	N/A	-
Alkalinity, total (as CaCO3)	150	253	A	N	N/A	-
Arsenic	1.8	0.40	B	Y	69 - 95	90
Boron	<0.1	1.4	-	N	0 - 20	220
Barium	0.16	0.099	B	N	N/A	-
Calcium	37	80	A	N	N/A	-
Cadmium	<0.005	0.0058	-	N	97 - 100	1
Chloride	15	41	A	N	N/A	-
Chromium	<0.005	0.016	-	N	95 - 100	1.9
Copper	<0.005	0.13	-	N	91 - 100	1.8
Fluoride	0.6	2.5	D	N	N/A	-
Iron	0.01	0.015	D	N	N/A	-
Mercury	<0.0001	0.0001	-	Y	100	0.96
Potassium	7	12	C	N	N/A	-
Magnesium	6.5	27.5	A	N	N/A	-
Manganese	0.005	0.094	A	N	71 - 98	3.8
Sodium	53	58	C	N	N/A	-
Nickel	<0.01	0.02	-	N	94 - 99	2.7
Nitrate as N	0.05	0.85	A	N	N/A	-
Lead	<0.004	0.011	-	N	87 - 100	0.95
pH (standard units)	8.4	7.4 -7.9	N/A	N	N/A	-
Phosphorous	N/A	0.005	-	N	N/A	-
Antimony	<0.05	0.01	-	Y	73 - 79	9.2
Selenium	<0.005	0.039	-	N	35 - 96	1
Sulfate	51	111	D	N	N/A	-
Thallium	<0.005	0.005	-	N	45 - 98	0.44
Zinc	<0.02	0.045	-	N	98 - 100	14

All units in mg/L unless otherwise noted.

[1] Water quality measured on 8/14/1992.

[2] See section 5.6.1 of Geomega 2008c.

A: solute concentrations always exceed concentrations measured at DS-66.

B: solute concentrations always below concentrations measured at DS-66.

C: solute concentrations exceed DS-66 for a short duration during its peak.

D: solute concentrations are intially below DS-66 but increase above DS-66 later in simulation.

[3] Attenuation was only invoked in the transport model for analytes for which an isotherm could be fit.

[4] The range, in percent, of mass attenuated during batch tests at various concentrations.

[5] The maximum aqueous concentration applied during batch attenuation tests.

N/A = not analyzed.

Discussion of Model Results for Proposed Action Alternative

Based on experience at numerous mine sites, there will be oxidation of sulfide minerals and the production of acid rock drainage (ARD) if water and oxygen enter the PAG cells (Davis and Ritchie 1986). Neutralization of ARD and attenuation of metals and other constituents will occur in underlying carbonate rock; this is the primary chemical reaction employed by passive and active ARD treatment systems (Cravotta and Trahan 1999; Gusek and Wildeman 2002; Nordstrom 1982; Skousen *et al.* 1998). The outputs of geochemical models reviewed above concerning metals migration and attenuation are generally supported by current literature. Batch testing using site-derived materials, and evaluation of potentially analogous sites, provide an additional level of validation to the predicted results (Geomega 2008c).

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APPENDIX B-1
GENESIS PROJECT GEOCHEMISTRY
ADDENDUM SUMMARY

APPENDIX B-1
GENESIS PROJECT GEOCHEMISTRY ADDENDUM SUMMARY

INTRODUCTION

Appendix B-1 provides additional information regarding the static testing methods used for the Genesis waste rock characterization described in **Appendix B**. This information is provided to clarify issues regarding interpretation of static test data during BLM review of the Geomega reports.

This appendix summarizes information provided in *Addendum to the Newmont Genesis Project Characterization of Wall Rock and Waste Rock Chemistry* report (Geomega 2009) which was prepared to:

- Clarify the acid-base accounting (ABA) method used in the indicated report;
- Describe the differences between SVL Analytical Inc. (SVL) modified Sobek and Nevada modified Sobek;
- Compare the results from the SVL modified Sobek with the net carbonate value (NCV);
- Clarify acid generating potential for Composite 34; and
- Update the field oxidation test data.

Geomega estimated the acid generating potential of waste rock at the Genesis site using data collected by Newmont Metallurgical Services (NMS) and SVL. Newmont Mining Corporation (NMC) uses the NCV test method as an indicator for acid generating or acid-neutralizing potential. This method was developed by NMS (Bucknam 2003) for operational testing, and has been standardized as the American Society for Testing and Materials (ASTM) method E1915-07 (ASTM 2007). To validate the accuracy of NCV results, the SVL modified Sobek ABA and other static and kinetic tests were performed as well. Because the SVL modified Sobek ABA tests were not conducted following the Nevada modified Sobek method (Reclamation Research Unit and Schafer and Associates 1987), the differences between both modified Sobek testing methods are discussed below.

STATIC TESTING PROGRAM

In order to develop a representative characterization of mine waste rock chemistry, samples from each NCV, lithology, and alteration type to be mined in the Genesis complex were collected from exploration drilling rejects. From 3,400 boreholes in and around the deposit, 15,000 individual samples were analyzed for NCV, from which 533 samples were composited according to similar NCV, lithology, and alteration types into 34 composite samples. Genesis waste rock is differentiated into six NCV types within the study area, following the NMC standard NCV classification system (**Table B-1-1**).

TABLE B-1-1 Net Carbonate Value (NCV) Type Classification			
Code	**Classification**	**NCV Range (% CO_2)**	**Alteration Type**
1	Acidic	-5 < NCV ≤ -1	US, UCD
2	Slightly acidic	> -1 NCV ≤ -0.1	US, UCD
3	Inert/neutral	> -0.1 NCV < 0.1	US, OS, UCD
4	Slightly basic	≥ 0.1 NCV < 1	US, OS, UCD
5	Basic	≥ 1 NCV < 5	US, OS, OC
6	Highly basic	NCV ≥ 5	OC, OCD, UC

US = Unoxidized siliceous; UCD = Unoxidized carbonate decalcified; OS = Oxidized siliceous; OC = Oxide carbonate; OCD = Oxide carbonate decalcified; UC = Unoxidized carbonate.

Source: Geomega 2009

All major combinations of lithology, alteration, and NCV type present at the Genesis complex are represented in this suite with the associated waste rock tonnage (**Table B-1-2**).

TABLE B-1-2 Relationship of Genesis Lithology, Alteration, and NCV Types				
Lithology	**Alteration Type**	**NCV Type**	**Composite ID**	**Waste Rock (Mt)**
Siliceous rock	Oxide siliceous (OS)	Inert/neutral	**15**, **16**, 18, **19**, **20**, 24	17.9
		Slightly basic	13, 17, 22, **23**	95.0
		Basic	14, **21**	9.5
	Unoxidized siliceous (US)	Acidic	28, **30**	6.5
		Slightly acidic	**31**, 32, 35	5.0
		Inert/neutral	29	2.0
		Slightly basic	33	5.8
		Basic	**34**	1.9
Carbonate rock	Oxide carbonate (OC)	Basic	**3**	7.0
		Highly basic	**1**, 2, **4**	103.0
	Oxide carbonate decalcified (OCD)	Inert/neutral	**5**, **7**, **11**	26.0
		Slightly basic	**6**, **8**, 12	90.7
		Highly basic	**10**	28.0
	Unoxidized carbonate (UC)	Highly basic	25	19.0
	Unoxidized carbonate decalcified (UCD)	Acidic	**26**	10.7
		Slightly acidic	**27**	13.0
TOTAL TONS[1]				**440.5**

Composite IDs in **highlighted bold** were used for kinetic tests.
Mt = Million tons; NCV = Net Carbonate Value
[1] Total tonnage does not include 9Mt of waste rock from the Bluestar Ridge Pit.

Source: Modified from Table 2-2 (Geomega 2009)

Several static tests were conducted on splits of the 34 composite samples, including NCV, ABA, paste pH, peroxide acid generation (PAG), and acid-neutralization potential acidity (ANPA), while biological acid production potential (BAPP) was conducted on 28 composite samples that excluded all five of the Code 6 and one of Code 5 samples (Geomega 2008). Twenty of the 34 samples representing major combinations of lithology, alteration, and NCV type present at the Genesis complex were selected for humidity cell and field oxidation tests (Geomega 2008).

Acid-Base Accounting Methods

Net Carbonate Value

The process of calculating NCV differs from the Sobek method of ABA (Sobek *et al.* 1978) because acid-neutralizing potential (NP) and acid-generating potential (AP) are determined by combustion infrared absorption spectrometry, ASTM method E 1915-07 (ASTM 2007). NCV determination is based on units of percent CO_2, due to the availability of certified standard reference materials with known CO_2, content, for quality assurance and compliance purposes (Bucknam 2003; ASTM 2007).

Total carbon and sulfur analyses are performed by oxidation of carbon- and sulfur-containing samples to carbon dioxide (CO_2,) and sulfur dioxide (SO_2), with combustion in a stream of oxygen, utilizing a LECO furnace. A sample (0.25 g) is combusted at 1,350°C or higher to produce CO_2, and SO_2, which is measured using infrared absorption. For residual sulfur from pyrolysis, a sample (0.25 g) is initially roasted to remove sulfide and then analyzed for sulfur. The sulfur analysis is performed by oxidation of sulfur-containing samples to SO_2 in a stream of oxygen, using a LECO furnace. The sample is initially roasted in an oven at 550°C for one hour and then combusted at 1,350°C or higher.

For acid-insoluble carbon, a sample is treated with boiling hydrochloric acid (HCl, 20%) to remove carbonate minerals. The remaining residue is washed with deionized (DI) water, filtered, and dried. The dried residue (0.25 g) is then analyzed for carbon using combustion, with a LECO furnace at 1,350°C or higher. The NP is calculated based on the carbonate carbon content, which is determined either by the difference between total carbon (CTOT) and residual carbon after reaction with HCl (CAI), per the following equations:

$$\text{NP (\% CO)} = 3.67 \times \text{\% carbonate carbon content} \qquad \textbf{(1)}$$

$$\text{NP (\%}CO_2\text{,)} = 3.67 \times (\text{CTOT - CAI}) \qquad \textbf{(2)}$$

AP is determined from sulfide sulfur by the difference between total sulfur (STOT) and sulfur after pyrolysis at 550°C (SAP), as follows:

$$\text{AP (\%}CO_2\text{,)} = 1.37 \times \text{\% sulfide sulfur} \qquad \textbf{(3)}$$

$$\text{AP (\%}CO_2\text{,)} = 1.37 \times (\text{STOT - SAP}) \qquad \textbf{(4)}$$

NCV is calculated by subtracting AP from NP, as follows:

$$\text{NCV (\%}CO_2\text{,)} = \text{NP} - \text{AP} \qquad \textbf{(5)}$$

Negative NP and AP are corrected to zero before NCV calculation. The results of NCV, NP, and AP in percent CO_2 can be converted to parts per thousand calcium carbonate (ppt $CaCO_3$) by multiplying by 22.7. Net neutralization potential (NNP) and NP/AP ratios were then calculated using Equations 1 thru 5 (above).

SVL Modified Sobek Method

ABA determines the AP and NP of a sample (Sobek *et al.* 1978), as does NCV. The SVL modified Sobek method is different from the Nevada modified Sobek for determining the sulfur content, as discussed below.

To determine NP, the SVL modified Sobek method measures the percentage of carbonates present in a sample by treating the sample with a known excess of standardized HCl (SVL 2009a). Fizz testing is initially conducted to determine the amount of sample to be used (as an alternative to fizz testing, total carbon obtained from a LECO analyzer can be used to determine the sample amounts). The sample and HCl are heated for a minute to insure that the reaction between the acid and carbonates goes to completion. The amount of unconsumed acid is determined by titration with standardized sodium hydroxide (NaOH), to pass pH 8.3.

The SVL modified Sobek method for AP is established by determining three forms of sulfur content: total sulfur, non-extractable sulfur, and non-sulfate sulfur (SVL 2009a, 2009b). Total sulfur is determined from analysis of a 0.2 g sample that has undergone 200-mesh screening (0.074 mm). The sample is then combusted at 1,350°C or higher using a LECO furnace. Non-extractable sulfur is determined after digestion with 2N nitric acid (HNO_3) in a water bath at 95°C for six hours; the sample is then filtered, cleaned using hot DI until pH ≥ 5, air-dried overnight, and analyzed by a LECO analyzer. Non-sulfate sulfur is determined after digestion with hot DI water at 95°C for six hours; the sample is then filtered and analyzed by a LECO analyzer. Sulfate sulfur is determined from the difference between total sulfur and non-sulfate sulfur. AP is determined from sulfide sulfur by the difference between STOT, non-extractable sulfur (Non-extract S), and sulfate sulfur (SO_4), as follows:

$$\text{AP (\% CO)} = 1.37 \times \text{\% sulfide sulfur} \quad \textbf{(6)}$$

$$\text{AP (\% CO)} = 1.37 \times (\text{STOT} - \text{Non-extract S} - SO_4 \quad \textbf{(7)}$$

NNP is calculated by subtracting AP from NP. The results of NNP, NP, and AP in percent CO_2, can be converted to ppt $CaCO_3$ by multiplying by 22.7.

Nevada Modified Sobek Method

The Nevada Bureau of Land Management (BLM) prefers that waste rock samples be characterized using the Nevada modified Sobek method (Reclamation Research Unit and Schafer and Associates 1987). This version describes procedures to determine total sulfur, total sulfur after hot DI water leach, total sulfur after HCl treatment, total sulfur after HNO_3 treatment of a crushed sample, and NP.

To determine NP, the amount of carbonates present in a sample is measured by treating a sample with a known excess of standardized HCl (SVL 2009a). Fizz testing is conducted to insure the addition of

sufficient acid to react with all carbonates. To avoid overestimating NP, this modified Sobek procedure uses several ranges of acid volumes and concentrations, added on the basis of the degree of fizz observed when the sample reacts with one or two drops of HCl. If a low fizz rating is observed, two grams of sample are reacted with 40 mL of 0.1 Molar HCl and heated to near boiling until the reaction ceases. If the titrated volume of NaOH is <3 mL to obtain a pH 7.0, a higher concentration of acid is used. More intense fizzing necessitates the addition of a greater volume of acid and/or higher concentrations of acid prior to titration. The sample and HCl are heated until the reaction between the acid and carbonates goes to completion. The solution is diluted to 125 mL and boiled for one minute, and then back-titrated with 0.1 Molar or 0.5 Molar NaOH, to pH 7.0. The $CaCO_3$ equivalent of the samples is obtained by determining the amount of unconsumed acid by titration with standardized NaOH, to pH 7.0.

Total sulfur of an untreated sample is determined from analysis of a 0.5 g sample that has undergone 60-mesh screening (0.25 mm). The sample is then combusted at 1,350°C or higher using a LECO furnace. A stream of oxygen is passed through the sample during the heating period and SO_2 is released and measured using infrared absorption. Hot DI water leaches soluble sulfate that may form in the oxidized waste rocks, for example, melanterite ($FeSO_4.7H_2O$) and rozenite ($FeSO_4.4H_2O$) but not alunite ($KAl_3(SO_4)_2(OH)_6$) or jarosite ($KFe_3(SO_4)_2(OH)_6$) (Reclamation Research Unit and Schafer and Associates 1987). After hot DI water treatment, the sample is then combusted at 1,350°C or higher using a LECO furnace.

Hot DI-extractable sulfur = STOT - STOT after hot DI leach **(8)**

Total sulfur after HCl and HNO_3 treatments is determined from splits of the samples that have undergone 100-mesh screening (0.149 mm). After digestion with HCl and HNO_3, the samples are filtered, cleaned with DI water (until electrical conductivity is <100 µmhos/cm), air-dried overnight, and then combusted at 1,350°C or higher using a LECO furnace. The HCl-extractable sulfur includes acid-dissociable sulfides (e.g., pyrrhotite, chalcopyrite, and sphalerite) and less-soluble sulfates (e.g., gypsum or anhydrite). The HNO_3-extractable sulfur contains mostly pyrite.

HCl-extractable sulfur = STOT after hot DI leach - STOT after HCl treatment **(9)**

Residual sulfur = STOT after HNO_3 treatment **(10)**

Pyrite sulfur = STOT after HCl treatment - Residual sulfur **(11)**

AP is calculated using Equation 6. NNP is calculated by subtracting AP from NP. The results of NNP, NP, and AP in percent CO_2 can be converted to ppt $CaCO_3$ by multiplying by 22.7.

Method Comparison: SVL modified Sobek method versus Nevada Modified Sobek Method

The SVL modified Sobek method is different from the Nevada modified Sobek for determining three forms of sulfur content. The SVL modified Sobek method uses acid (HNO_3) digestion and hot DI water extraction on two splits of a sample before roasting to determine sulfide content, while the Nevada modified Sobek uses a two-acid (HNO_3 and HCl) digestion method. In addition, the process of calculating sulfide content is different between the two methods (discussed above). To determine NP,

the SVL modified Sobek method measures the amount of unconsumed acid by titration with NaOH to pass pH 8.3, while the Nevada modified Sobek uses the end titration pH of 7.0.

FIELD OXIDATION TESTS

Twenty composite samples were tested for field oxidation tests (**Table B-1-2**). A total of 335 leachate samples were collected during the 2.6 year field oxidation tests and the results reported in **Appendix B** are updated below.

SUMMARY OF RESULTS

Acid-Base Accounting Methods

Net Carbonate Value

The NCV of the 34 composite samples ranged from -1.9 percent to 13.9 percent CO_2, (NNP at -42 to 314 ppt $CaCO_3$), covering Codes 1 to 6 (**Table B-1-3**). Composites 18, 20, 26, 27, 28, 29, 30, 31, 32, and 35 showed negative NCV or NNP values, characteristic of Codes 1 and 2, although Composites 18, 20, and 29 are classified as Code 3. Of the 34 samples, 18 did not demonstrate AP, and NP values ranged from 0 percent to 13.9 percent CO_2 (314 ppt $CaCO_3$).

Guidelines from the United States BLM (1996) indicate that it is not likely that material with a NNP >20 ppt $CaCO_3$ and an NP/AP ratio >3 will generate acid. If the material has an NP/AP ratio <1 and/or a NNP <-20 ppt $CaCO_3$, it is considered as acid-generating. In cases where the NNP is between -20 and 20 ppt $CaCO_3$ or the NP/AP ratio is between 1 and 3, the material is not necessarily acid generating; BLM (1996) guidance recommends additional evaluation. The NNP cutoff of 20 ppt $CaCO_3$ is equivalent to 0.88 percent CO_2, which approximately represents the upper limit (1% CO_2) of the NMC standard NCV class of "slightly basic" (Code 4). Of the 34 composite samples, 9 from all Codes 5 and 6 and one of the eight Code 4 samples (Composites 1, 2, 3, 4, 10, 12, 14, 21, 25, and 34) met or exceeded the BLM criteria (**Table B-1-3**). However, results from 21 of the 34 Genesis composite samples from Codes 2 through 4 were "uncertain" and 3 samples from Code 1 (Composites 26, 28, and 30) were considered as acid-generating based on the static test results.

SVL Modified Sobek Method

The NNP of the 34 composite samples ranged from -1.5 percent to 15.9 percent CO_2 (-33.4 to 362 ppt $CaCO_3$), covering Codes 1 to 6 (**Table B-1-4**). Of the 34 composite samples, 18 (Composites 5, 6, 7, 8, 11, 12, 15, 16, 17, 18, 19, 20, 21, 26, 27, 28, 30, and 35) showed negative NNP values. Nine samples had NCV $\leq$ -0.1 percent CO_2 (characteristic of Codes 1 and 2) while the remaining 9 samples (Composites 5, 6, 7, 11, 15, 16, 17, 19, and 20) have NCV between -0.1 and 0 percent CO_2 (characteristic of Code 3). Six of the 34 samples demonstrated AP below the detection limit (<0.01% CO_2) and NP values ranged from <0.01 percent to 15.9 percent CO_2, (362 ppt $CaCO_3$). Six of the 34 samples (Composites 1, 2, 3, 4, 25, and 32) met or exceeded the BLM criteria; 26 samples were "uncertain"; and 2 samples (Composites 26 and 28) were acid-generating based on the static test results (**Table B-1-4**).

Table B-1-3. Net carbonate value results from the Genesis samples by NMS.

Composite ID	NCV Type	Total Sulfur (% S)	SAP (% S)	Sulfide Sulfur (% S)	Total Carbon (% C)	CAI (% C)	Carbonate (% C)	NP (% CO_2)	NP (ppt $CaCO_3$)	AP (% CO_2)	AP (ppt $CaCO_3$)	NCV (% CO_2)	NCV* (ppt $CaCO_3$)	NP/AP**
1	Code 6	0.11	0.17	<0.01	3.52	0.14	3.38	12.41	282	<0.01	<0.3	12.4	282 N	1241 N
2	Code 6	0.22	0.26	<0.01	4.29	0.63	3.66	13.44	305	<0.01	<0.3	13.4	305 N	1344 N
3	Code 5	0.26	0.23	0.03	0.96	0.15	0.81	2.98	68	0.04	1.0	2.9	67 N	70 N
4	Code 6	0.31	0.34	<0.01	4.06	0.29	3.77	13.85	314	<0.01	<0.3	13.9	314 N	1385 N
5	Code 3	0.09	0.13	<0.01	0.56	0.54	0.02	0.07	1	<0.01	<0.3	0.07	1 U	7 N
6	Code 4	0.18	0.21	<0.01	0.71	0.64	0.07	0.26	6	<0.01	<0.3	0.3	6 U	26 N
7	Code 3	0.13	0.13	<0.01	0.34	0.32	0.02	0.06	1	<0.01	<0.3	0.06	1 U	6 N
8	Code 4	0.12	0.14	<0.01	1.42	1.36	0.06	0.21	5	<0.01	<0.3	0.2	5 U	21 N
10	Code 6	0.17	0.21	<0.01	1.45	0.03	1.42	5.22	118	<0.01	<0.3	5.2	118 N	522 N
11	Code 3	0.37	0.38	<0.01	0.24	0.23	0.01	0.05	1	<0.01	<0.3	0.05	1 U	5 N
12	Code 4	0.52	0.55	<0.01	0.40	0.14	0.26	0.95	21	<0.01	<0.3	0.9	21 N	95 N
13	Code 4	0.03	0.06	<0.01	0.11	0.07	0.04	0.14	3	<0.01	<0.3	0.1	3 U	14 N
14	Code 5	0.02	0.05	<0.01	0.57	0.13	0.44	1.61	37	<0.01	<0.3	1.6	37 N	161 N
15	Code 3	0.07	0.09	<0.01	0.26	0.26	<0.01	<0.01	<0.3	<0.01	<0.3	0.01	0 U	1 A-ND
16	Code 3	0.07	0.09	<0.01	0.5	0.51	<0.01	<0.01	<0.3	<0.01	<0.3	0	0 U	1 A-ND
17	Code 4	0.10	0.14	<0.01	0.83	0.79	0.04	0.16	4	<0.01	<0.3	0.2	4 U	16 N
18	Code 3	0.37	0.21	0.16	0.18	0.13	0.05	0.19	4	0.2	5.0	-0.03	-1 U	0.9 A
19	Code 3	0.18	0.14	0.04	0.41	0.38	0.03	0.11	2	0.05	1.2	0.05	1 U	1.9 U
20	Code 3	0.26	0.2	0.06	0.94	0.94	0.003	0.01	0	0.08	1.8	-0.07	-2 U	0.1 A
21	Code 5	0.50	0.37	0.13	1.15	0.69	0.5	1.70	39	0.2	4.0	1.5	35 N	10 N
22	Code 4	0.04	0.07	<0.01	0.2	0.17	0.03	0.12	3	<0.01	<0.3	0.1	3 U	12 N
23	Code 4	0.07	0.1	<0.01	0.3	0.18	0.09	0.32	7	<0.01	<0.3	0.3	7 U	32 N
24	Code 3	0.08	0.1	<0.01	0.3	0.27	0.02	0.07	1	<0.01	<0.3	0.07	1 U	7 N
25	Code 6	1.58	1.4	0.18	3.2	0.41	2.8	10.27	233	0.3	5.7	10.0	227 N	41 N
26	Code 1	2.37	0.99	1.38	0.6	0.54	0.01	0.04	1	1.9	43.0	-1.9	-42 A	0.0 A
27	Code 2	0.86	0.43	0.43	0.8	0.81	0.01	0.04	1	0.6	13.3	-0.5	-12 U	0.1 A
28	Code 1	1.61	0.25	1.36	0.2	0.2	0.02	0.08	2	1.9	42.2	-1.8	-40 A	0.0 A
29	Code 3	1.22	0.59	0.63	1.6	1.41	0.21	0.79	18	0.9	19.6	-0.08	-2 U	0.9 A
30	Code 1	1.67	0.28	1.39	0.6	0.59	0.04	0.16	4	1.9	43.2	-1.7	-40 A	0.1 A
31	Code 2	1.17	0.39	0.78	0.5	0.29	0.17	0.62	14	1.1	24.2	-0.4	-10 U	0.6 A
32	Code 2	1.09	0.42	0.67	1	0.88	0.17	0.61	14	0.9	20.9	-0.3	-7 U	0.7 A
33	Code 4	1.37	0.55	0.82	0.6	0.22	0.35	1.28	29	1.1	25.4	0.2	4 U	1.1 U
34	Code 5	1.51	0.71	0.80	1	0.04	0.96	3.50	80	1.1	24.9	2.4	55 N	3.2 N
35	Code 2	0.98	0.3	0.68	0.23	0.17	0.06	0.22	5	0.9	21.0	-0.7	-16 U	0.2 A

Source: Modified from Table 3-1 of Addendum to the Newmont Genesis Project Characterization of Wall Rock and Waste Rock Chemistry, originally dated June 17, 2008; Geomega, November 18, 2009.

* Classification based on BLM criteria: A = acid generating (NCV ≤ -20 ppt $CaCO_3$); U = Uncertain (NCV is between -20 and +20 ppt CaCO3); N = Non-Acid Generating (NCV ≥ 20 ppt CaCO3)

** Classification based on US EPA (1994) criteria: A = Acid Generating (NP:AP ≤ 1); A-ND = Acid Generating but NP and AP both non-detect; U = Potentially Acid Generating or Uncertain (NP:AP is between 1 and 3);
N = Acid Neutralizing (NP:AP ≥ 3)

AP = acid-generating potential.
BLM = Bureau of Land Management.
CAI = residual carbon acid, insoluble.
NCV = net carbonate value.
NMS = Newmont Metallurgical Services.
NP = acid-neutralizing potential.
SAP = residual sulfur after pyrolysis.
ppt = parts per thousand.
When % sulfide and % carbonate values are less than detection limit, AP, NP, and NP/AP are calculated using the detection limit.
All analyses were performed by NMS using the NCV method (Geomega 2008).
Note: Composite 9 was omitted from analysis.

Table B-1-4. Acid-base accounting and paste pH results from the Genesis samples, by SVL Analytical Inc.

Composite ID	NCV Type	Paste pH (su)	Total Sulfur (% S)	Nonextractable Sulfur (% S)	Pyrite Sulfur (% S)	Sulfate Sulfur (% S)	Carbonate (% C)	NP (% CO_2)	NP (ppt $CaCO_3$)	AP (% CO_2)	AP (ppt $CaCO_3$)	NNP (% CO_2)	NNP* (ppt $CaCO_3$)	NP/AP**
1	Code 6	8.84	<0.01	<0.01	<0.01	<0.01	3.8	13.9	316	<0.01	<0.3	13.9	316 N	1053 N
2	Code 6	8.11	<0.01	<0.01	<0.01	<0.01	3.2	11.7	265	<0.01	<0.3	11.7	265 N	883 N
3	Code 5	8.57	0.17	<0.01	0.12	0.05	1.2	4.3	96.9	0.2	3.8	4.1	93.1 N	26 N
4	Code 6	8.63	<0.01	<0.01	<0.01	<0.01	4.3	15.9	362	<0.01	<0.3	15.9	362 N	1207 N
5	Code 3	7.51	0.07	<0.01	0.02	0.05	<0.01	<0.01	<0.3	0.03	0.6	-0.03	-0.6 U	0.5 A
6	Code 4	7.28	0.11	0.02	0.03	0.06	<0.01	<0.01	<0.3	0.04	0.9	-0.04	-0.9 U	0.3 A
7	Code 3	5.66	0.08	<0.01	0.02	0.06	<0.01	<0.01	<0.3	0.03	0.6	-0.03	-0.6 U	0.5 A
8	Code 4	5.3	0.07	<0.01	0.07	<0.01	<0.01	<0.01	<0.3	0.1	2.2	-0.1	-2.2 U	0.1 A
10	Code 6	8.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.3	<0.01	<0.3	<0.01	<0.3 U	1 A-ND
11	Code 3	6.8	0.23	0.02	0.05	0.16	<0.01	<0.01	<0.3	0.07	1.6	-0.07	-1.6 U	0.2 A
12	Code 4	7.59	0.37	0.08	0.09	0.2	<0.01	<0.01	<0.3	0.1	2.8	-0.1	-2.8 U	0.1 A
13	Code 4	7.8	0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.3	<0.01	<0.3	<0.01	<0.3 U	1 A-ND
14	Code 5	7.87	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.3	<0.01	<0.3	<0.01	<0.3 N	1 A-ND
15	Code 3	7.43	0.04	<0.01	0.01	0.03	<0.01	<0.01	<0.3	0.01	0.3	-0.01	-0.3 U	1.0 A
16	Code 3	7.04	0.04	<0.01	0.02	0.02	<0.01	<0.01	<0.3	0.03	0.6	-0.03	-0.6 U	0.5 A
17	Code 4	7.64	0.06	0.01	0.02	0.03	<0.01	<0.01	<0.3	0.03	0.6	-0.03	-0.6 U	0.5 A
18	Code 3	5.24	0.26	<0.01	0.07	0.19	<0.01	<0.01	<0.3	0.1	2.2	-0.1	-2.2 U	0.1 A
19	Code 3	7.01	0.12	0.01	0.03	0.08	<0.01	<0.01	<0.3	0.04	0.9	-0.04	-0.9 U	0.3 A
20	Code 3	6.99	0.17	<0.01	0.06	0.11	<0.01	<0.01	<0.3	0.08	1.9	-0.08	-1.9 U	0.2 A
21	Code 5	7.2	0.33	<0.01	0.12	0.21	<0.01	<0.01	<0.3	0.2	3.8	-0.2	-3.8 U	0.1 A
22	Code 4	7.54	0.03	<0.01	0.01	0.02	0.1	0.4	10.2	0.01	0.3	0.4	9.9 U	34 N
23	Code 4	7.47	0.04	<0.01	0.01	0.03	0.1	0.4	8.2	0.01	0.3	0.3	7.9 U	27 N
24	Code 3	7.6	0.05	<0.01	0.02	0.03	0.14	0.5	11.7	0.03	0.6	0.5	11.1 U	20 N
25	Code 6	6.82	1.28	<0.01	0.35	0.93	2.3	8.4	191	0.5	10.9	7.9	180 N	18 N
26	Code 1	4.11	2.11	0.1	1.11	0.9	0.02	0.1	1.3	1.5	34.7	-1.5	-33.4 A	0.0 A
27	Code 2	4.68	0.65	<0.01	0.3	0.35	<0.01	<0.01	<0.3	0.4	9.4	-0.4	-9.4 U	0.0 A
28	Code 1	6.24	1.41	0.02	0.77	0.62	0.02	0.1	1.5	1.1	24.1	-1	-22.5 A	0.1 A
29	Code 3	7.01	0.98	0.07	0.31	0.6	0.3	1.0	23	0.4	9.7	0.6	13.3 U	2.4 U
30	Code 1	6.1	1.44	0.02	0.82	0.6	0.2	0.7	15;3	1.1	25.6	-0.5	-10.3 A	0.6 A
31	Code 2	6.8	0.93	0.02	0.34	0.57	0.2	0.8	19.1	0.5	10.6	0.4	8.5 U	1.8 U
32	Code 2	7.44	0.84	0.03	0.48	0.33	0.6	2.0	45.9	0.7	15	1.4	30.9 N	3.1 N
33	Code 4	7.51	1.06	0.04	0.53	0.49	0.4	1.4	31.9	0.7	16.6	0.7	15.3 U	1.9 U
34	Code 5	6.99	1.18	0.03	0.47	0.68	0.4	1.5	34.4	0.6	14.7	0.9	19.7 U	2.3 U
35	Code 2	6.24	0.76	0.01	0.38	0.37	0.1	0.4	8.7	0.5	11.9	-0.1	-3.2 U	0.7 A

Source: Modified from Table 3-2 of Addendum to the Newmont Genesis Project Characterization of Wall Rock and Waste Rock Chemistry, originally dated June 17, 2008; Geomega, November 18, 2009.

* Classification based on BLM criteria: A = acid generating (NCV ≤ -20 ppt $CaCO_3$); U = Uncertain (NCV is between -20 and +20 ppt CaCO3); N = Non-Acid Generating (NCV ≥ 20 ppt CaCO3)

** Classification based on US EPA (1994) criteria: A = Acid Generating (NP:AP ≤ 1); A-ND = Acid Generating but NP and AP both non-detect; U = Potentially Acid Generating or Uncertain (NP:AP is between 1 and 3); N = Acid Neutralizing (NP:AP ≥ 3)

AP = acid-generating potential.
BLM = Bureau of Land Management.
NCV = net carbonate value.
NNP = net neutralization potential.
NP = acid-neutralizing potential.
ppt = parts per thousand.
When % sulfide and % carbonate values are less than detection limit, AP, NP, and NP/AP are calculated using the detection limit.
All analyses were performed by SVL Analytical Inc (Geomega 2008) using the SVL modified Sobek method.
Note: Composite 9 was omitted from analysis.

Summary Comparison: NCV versus SVL modified Sobek method results

The SVL modified Sobek NP generally showed good agreement with the values measured by the NCV method, with R2 = 0.91 (**Figure B-1-1**), although the SVL NP values are generally lower than the NCV and ANPA results. Using the mineralogical data, calcite and dolomite were generally detected in most samples at various content levels, except for Composites 8, 13, 18, 22, 24, 28, 29, 33, and 35. In Composites 21 and 34, dolomite was present as the dominant carbonate mineral (Geomega 2008). Dolomite is relatively slower to dissolve compared to calcite, which may be reflected by the low values of SVL NP and ANPA. Both the SVL modified Sobek NP and ANPA utilized a titration method to determine carbonate content, where the NCV method used the combustion method by converting all carbonate to CO_2.

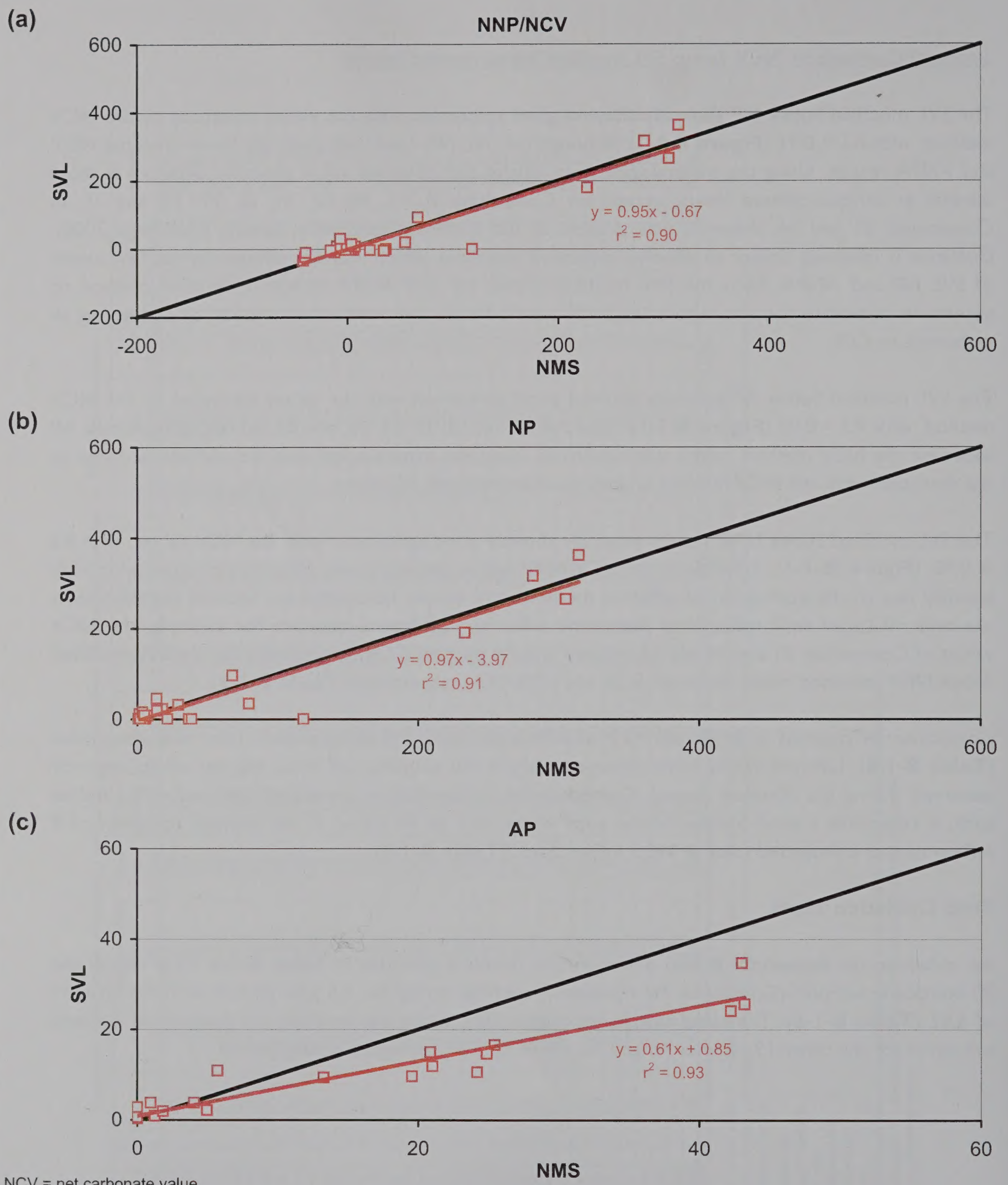
The SVL modified Sobek AP generally showed good agreement with the values measured by the NCV method, with R2 = 0.93 (**Figure B-1-1**). Composites 10, 12, 13, 22, 23, and 24 did not demonstrate AP based on the NCV method, which was confirmed using the mineralogical data. For AP values close to the detection limit, the NCV method is likely to underestimate AP values.

The SVL modified Sobek NNP results generally showed good agreement with the NCV values, with R2 = 0.90 (**Figure B-1-1**). Differences in NCV/NNP values between two laboratories were observed, possibly due to the application of different methods and sample heterogeneity, because the ABA tests use only ~0.2 g of solid material to determine sulfur and carbonate content. For example, the NCV values of Composites 21 and 34 are 1.5 percent and 2.4 percent CO_2, respectively, but the SVL modified Sobek NNP indicated lower values of -0.2% and 0.9% CO_2, respectively (**Table B-1-5**).

Composite 34 resulted in BAPP pH <3.5 and PAG pH <4.5, indicating potential for acid generation (**Table B-1-6**). Low pH values were observed early in the humidity cell tests, but net acidity was not observed during the 20-week period. Composite 34 is classified as unoxidized siliceous (US), and as such, it comprises a small fraction of the total waste rock to be mined in the Genesis complex (~1.9 million tons of a projected total of 440.5 million tons; (**Table B-1-2**).

Field Oxidation Tests

An update to the **Appendix B** field oxidation test results is provided in **Table B-1-6**. Only one of the 20 composite samples (Composite 26) released net acidity during the 2.6 year period, with the final pH of 4.62 (**Table B-1-6**). The same sample released acidity during the humidity cell tests. Final leachate pH values for the other 19 samples ranged from 6.06 to 9.59 during the testing period.



NCV = net carbonate value.
NMS = Newmont Metallurgical Services.
SVL = SVL Analytical Inc.
All units in ppt $CaCO_3$.
ppt = parts per thousand.

GEOMEGA 11/9/09 C08608A Newmont Genesis	Correlation of **(a)** acid-generating potential (AP), **(b)** acid-neutralizing potential (NP), and **(c)** net neutralization potential (NNP) using the SVL modified Sobek and NCV methods.	**Figure B-1-1**

Table B-1-5. Summary of acid-base accounting results from the Genesis samples.

Composite ID	NCV Type	NMS NP (% CO_2)	NMS NP (ppt $CaCO_3$)	SVL NP (% CO_2)	SVL NP (ppt $CaCO_3$)	NMS ANPA (% CO_2)	NMS AP (% CO_2)	NMS AP (ppt $CaCO_3$)	SVL AP (% CO_2)	SVL AP (ppt $CaCO_3$)	NMS NCV (% CO_2)	NMS NCV (ppt $CaCO_3$)	SVL NNP (% CO_2)	SVL NNP (ppt $CaCO_3$)
1	Code 6	12.41	282	13.9	316.0	12.2	<0.01	<0.3	<0.01	<0.3	12.4	282	13.9	316
2	Code 6	13.44	305	11.7	265.0	10.8	<0.01	<0.3	<0.01	<0.3	13.4	305	11.7	265
3	Code 5	2.98	68	4.3	96.9	3.2	0.04	1.0	0.2	3.8	2.9	67	4.1	93.1
4	Code 6	13.85	314	15.9	362.0	14.1	<0.01	<0.3	<0.01	<0.3	13.9	314	15.9	362
5	Code 3	0.07	1	<0.01	<0.3	0.4	<0.01	<0.3	0.03	0.60	0.07	1	-0.03	-0.6
6	Code 4	0.26	6	<0.01	<0.3	0.3	<0.01	<0.3	0.04	0.90	0.3	6	-0.04	-0.9
7	Code 3	0.06	1	<0.01	<0.3	0.1	<0.01	<0.3	0.03	0.60	0.06	1	-0.03	-0.6
8	Code 4	0.21	5	<0.01	<0.3	0.2	<0.01	<0.3	0.1	2.2	0.2	5	-0.1	-2.2
10	Code 6	5.22	118	<0.01	<0.3	3.6	<0.01	<0.3	<0.01	<0.3	5.2	118	<0.01	<0.3
11	Code 3	0.05	1	<0.01	<0.3	0.4	<0.01	<0.3	0.07	1.60	0.05	1	-0.07	-1.6
12	Code 4	0.95	21	<0.01	<0.3	1.1	<0.01	<0.3	0.1	2.8	0.9	21	-0.1	-2.8
13	Code 4	0.14	3	<0.01	<0.3	0.3	<0.01	<0.3	<0.01	<0.3	0.1	3	<0.01	<0.3
14	Code 5	1.61	37	<0.01	<0.3	1.9	<0.01	<0.3	<0.01	<0.3	1.6	37	<0.01	<0.3
15	Code 3	<0.01	<0.3	<0.01	<0.3	0.2	<0.01	<0.3	0.01	0.30	0	0	-0.01	-0.3
16	Code 3	<0.01	<0.3	<0.01	<0.3	0.2	<0.01	<0.3	0.03	0.60	0	0	-0.03	-0.6
17	Code 4	0.16	4	<0.01	<0.3	0.3	<0.01	<0.3	0.03	0.60	0.2	4	-0.03	-0.6
18	Code 3	0.19	4	<0.01	<0.3	0.1	0.2	5.0	0.1	2.2	-0.03	-1	-0.1	-2.2
19	Code 3	0.11	2	<0.01	<0.3	0.2	0.05	1.24	0.04	0.90	0.05	1	-0.04	-0.9
20	Code 3	0.01	0	<0.01	<0.3	0.2	0.08	1.83	0.08	1.90	-0.07	-2	-0.08	-1.9
21	Code 5	1.70	39	<0.01	<0.3	0.9	0.2	4.0	0.2	3.8	1.5	35	-0.2	-3.8
22	Code 4	0.12	3	0.4	10.2	0.2	<0.01	<0.3	0.01	0.30	0.1	3	0.4	9.9
23	Code 4	0.32	7	0.4	8.2	0.6	<0.01	<0.3	0.01	0.30	0.3	7	0.3	7.9
24	Code 3	0.07	1	0.5	11.7	0.7	<0.01	<0.3	0.03	0.60	0.07	1	0.5	11.1
25	Code 6	10.27	233	8.4	191.0	3.8	0.3	5.7	0.5	10.9	10.0	227	7.9	180
26	Code 1	0.04	1	0.1	1.3	0.1	1.9	43.0	1.5	34.7	-1.9	-42	-1.5	-33.4
27	Code 2	0.04	1	<0.01	<0.3	0.2	0.6	13.3	0.4	9.4	-0.5	-12	-0.4	-9.4
28	Code 1	0.08	2	0.1	1.5	0.1	1.9	42.2	1.1	24.1	-1.8	-40	-1	-22.5
29	Code 3	0.79	18	1.0	23.0	0.7	0.9	19.6	0.4	9.7	-0.08	-2	0.6	13.3
30	Code 1	0.16	4	0.7	15;3	0.5	1.9	43.2	1.1	25.6	-1.7	-40	-0.5	-10.3
31	Code 2	0.62	14	0.8	19.1	0.7	1.1	24.2	0.5	10.6	-0.4	-10	0.4	8.5
32	Code 2	0.61	14	2.0	45.9	1.1	0.9	20.9	0.7	15.0	-0.3	-7	1.4	30.9
33	Code 4	1.28	29	1.4	31.9	1.2	1.1	25.4	0.7	16.6	0.2	4	0.7	15.3
34	Code 5	3.50	80	1.5	34.4	1.3	1.1	24.9	0.6	14.7	2.4	55	0.9	19.7
35	Code 2	0.22	5	0.4	8.7	0.6	0.9	21.0	0.5	11.9	-0.7	-16	-0.1	-3.2

ANPA = acid-neutralization potential acidity.

AP = acid-generating potential.

NCV = net carbonate value.

NMS = Newmont Metallurgical Services.

NNP = net neutralization potential.

NP = acid-neutralizing potential.

ppt = parts per thousand.

SVL = SVL Analytical Inc.

Table B-1-6. Summary of various static and kinetic testing results for the Genesis samples.

		Static Test Results							Kinetic Test Results					
		NCV Type			Paste pH	MWMP	ABA Class[a,e]		PAG	BAPP	Humidity Cell Class	Humidity Cell Class	Field Oxidation Class	Field Oxidation Class
Composite ID	Location/ Alteration Type	NCV value[a] (% CO_2)	NCV value[a] (ppt $CaCO_3$)	NNP value[b] (ppt $CaCO_3$)	(su)	pH[e] (su)	NP/AP[a]	NCV[a] (ppt $CaCO_3$)	Final pH[d] (su)	Final pH[d] (su)	Final pH[c] (su)	Net Alkalinity[c] (mg/kg)	Final pH[f] (su)	Net Alkalinity[f] (mg/kg)
1	Bluestar	Code 6			8.84	8.24	Not potentially acid generating	Not potentially acid generating	Not acid producing	Not tested		Not acid producing		Not acid producing
Waste rock	OC	12.41	282	316			1241	282	8.42		7.11	801.6	6.85	2639
2	Genesis 1	Code 6			8.11	8.11	Not potentially acid generating	Not potentially acid generating	Not acid producing	Not tested	Not tested	Not tested	Not tested	Not tested
Waste rock	OC	13.4	305	265			1344	305	8.48					
3	Genesis 2	Code 5			8.57	8.26	Not potentially acid generating	Not potentially acid generating	Not acid producing	Not acid producing		Not acid producing		Not acid producing
Waste rock	OC	2.94	67	93			70	67	10.02	7.52	7.55	567.9	8.3	2875
4	Genesis 3	Code 6			8.63	8.32	Not potentially acid generating	Not potentially acid generating	Not acid producing	Not tested		Not acid producing		Not acid producing
Waste rock	OC	13.9	315	362			1385	315	7.93		7.98	786.3	9.38	2404
5	Bobcat	Code 3			7.51	8.19	Uncertain	Uncertain	Not acid producing	Not acid producing		Not acid producing		Not acid producing
Waste rock	OCD	0.07	1.5	-0.6			7	1.5	6.94	3.64	7.94	501.3	9.56	2391
6	Bobcat	Code 4			7.28	8.11	Uncertain	Uncertain	Not acid producing	Not acid producing		Not acid producing		Not acid producing
Waste rock	OCD	0.26	5.8	-0.9			26	5.8	7.44	3.66	7.46	692.5	6.32	2391
7	Genesis 1	Code 3			5.66	7.4	Uncertain	Uncertain	Not acid producing	Acid producing		Acid producing		1
Waste rock	OCD	0.06	1.3	-0.6			6	1.3	4.67	3.43	4.45	-85.6	8.59	1
8	Genesis 1	Code 4			5.3	7.18	Uncertain	Uncertain	Not acid producing	Acid producing		Acid producing		Not acid producing
Waste rock	OCD	0.21	4.7	-2.2			21	4.7	4.81	3.46	3.79	-129.6	7.49	1276

Table B-1-6. Summary of various static and kinetic testing results for the Genesis samples.

		Static Test Results							Kinetic Test Results					
		NCV Type			Paste pH	MWMP	ABA Class[a,e]		PAG	BAPP	Humidity Cell Class	Humidity Cell Class	Field Oxidation Class	Field Oxidation Class
Composite ID	Location/ Alteration Type	NCV value[a] (% CO_2)	NCV value[a] (ppt $CaCO_3$)	NNP value[b] (ppt $CaCO_3$)	(su)	pH[c] (su)	NP/AP[a]	NCV[a] (ppt $CaCO_3$)	Final pH[d] (su)	Final pH[d] (su)	Final pH[c] (su)	Net Alkalinity[c] (mg/kg)	Final pH[f] (su)	Net Alkalinity[f] (mg/kg)
10	Genesis 2	Code 6			8.07	8.79	Not potentially acid generating	Not potentially acid generating	Not acid producing	Not tested		Not acid producing		Not acid producing
Waste rock	OCD	5.22	118.6	<0.3			522	118.6	7.88		7.61	743.8	6.47	3419
11	Genesis 3	Code 3			6.8	7.92	Uncertain	Uncertain	Not acid producing	Not acid producing		Not acid producing		Not acid producing
Waste rock	OCD	0.05	1.1	-1.6			5	1.1	6.49	3.67	7.74	219.2	9.51	1999
12	Genesis 3	Code 4			7.59	8.34	Not potentially acid generating	Not potentially acid generating	Not acid producing	Not acid producing	Not tested	Not tested	Not tested	Not tested
Waste rock	OCD	0.95	21.5	-2.8			95	21.5	8.44	3.68				
13	Bluestar	Code 4			7.8	8.43	Uncertain	Uncertain	Not acid producing	Not acid producing	Not tested	Not tested	Not tested	Not tested
Waste rock	OS	0.14	3.3	<0.3			14	3.3	7.31	3.7				
14	Bluestar	Code 5			7.87	8	Not potentially acid generating	Not potentially acid generating	Not acid producing	Not tested	Not tested	Not tested	Not tested	Not tested
Waste rock	OS	1.61	36.7	<0.3			161	36.7	8.51					
15	Bobcat	Code 3			7.43	8.65	Uncertain	Uncertain	Not acid producing	Not acid producing		Not acid producing		Not acid producing
Waste rock	OS	0.01	0.2	-0.3			1	0.2	6	3.55	7.59	487.5	6.37	2076
16	Bobcat	Code 3			7.04	8.61	Uncertain	Uncertain	Not acid producing	Not acid producing		Not acid producing		Not acid producing
Waste rock	OS	0	0	-0.6			1	0	5.54	3.53	7.7	185.3	9.59	1833
17	Bobcat	Code 4			7.64	9.16	Uncertain	Uncertain	Not acid producing	Not acid producing	Not tested	Not tested	Not tested	Not tested
Waste rock	OS	0.16	3.6	-0.6			16	3.6	6.55	3.71				

Table B-1-6. Summary of various static and kinetic testing results for the Genesis samples.

		Static Test Results								Kinetic Test Results					
		NCV Type			Paste pH	MWMP	ABA Class[a,c]			PAG	BAPP	Humidity Cell Class	Humidity Cell Class	Field Oxidation Class	Field Oxidation Class
Composite ID	Location/ Alteration Type	NCV value[a] (% CO_2)	NCV value[a] (ppt $CaCO_3$)	NNP value[b] (ppt $CaCO_3$)	(su)	pH[c] (su)	NP/AP[a]	NCV[a] (ppt $CaCO_3$)		Final pH[d] (su)	Final pH[d] (su)	Final pH[e] (su)	Net Alkalinity[e] (mg/kg)	Final pH[f] (su)	Net Alkalinity[f] (mg/kg)
18	Genesis 1	Code 3			5.24	6.28	Uncertain	Uncertain		Acid producing	Acid producing	Not tested	Not tested	Not tested	Not tested
Waste rock	OS	-0.03	-0.6	-2.2			0.9	-0.6		3.73	3.24				
19	Genesis 1	Code 3			7.01	8.54	Uncertain	Uncertain		Not acid producing	Acid producing		Not acid producing		Not acid producing
Waste rock	OS	0.05	1.2	-0.9			1.9	1.2		4.89	3.48	7.84	146.3	6.5	1537
20	Genesis 1	Code 3			6.99	8.39	Uncertain	Uncertain		Not acid producing	Not acid producing		Not acid producing		Not acid producing
Waste rock	OS	-0.07	-1.6	-1.9			0.1	-1.6		5.34	3.59	7.83	333.3	6.5	2122
21	Genesis 1	Code 5			7.2	8.31	Not potentially acid generating	Not potentially acid generating		Not acid producing	Not acid producing		Not acid producing		Not acid producing
Waste rock	OS	1.52	35	-3.8			9.6	35		5.75	3.73	7.02	179.2	6.41	2187
22	Genesis 2	Code 4			7.54	8.64	Uncertain	Uncertain		Not acid producing	Not acid producing	Not tested	Not tested	Not tested	Not tested
Waste rock	OS	0.12	2.8	9.9			12	2.8		5.8	3.59				
23	Genesis 2	Code 4			7.47	8.67	Uncertain	Uncertain		Not acid producing	Not acid producing		Not acid producing		Not acid producing
Waste rock	OS	0.32	7.3	7.9			32	7.3		7.67	3.58	7.22	707.2	6.3	2011
24	Genesis 3	Code 3			7.6	7.73	Uncertain	Uncertain		Not acid producing	Not acid producing	Not tested	Not tested	Not tested	Not tested
Waste rock	OS	0.07	1.5	11			7	1.5		6.94	3.55				
25	Genesis 1/3	Code 6			6.82	7.68	Not potentially acid generating	Not potentially acid generating		Not acid producing	Not tested	Not tested	Not tested	Not tested	Not tested
Waste rock	UC	10	228	180			40.8	228		8.22					

Table B-1-6. Summary of various static and kinetic testing results for the Genesis samples.

		Static Test Results							Kinetic Test Results					
		NCV Type			Paste pH	MWMP	ABA Class[a,e]		PAG	BAPP	Humidity Cell Class	Humidity Cell Class	Field Oxidation Class	Field Oxidation Class
Composite ID	Location/ Alteration Type	NCV value[a] (% CO_2)	NCV value[a] (ppt $CaCO_3$)	NNP value[b] (ppt $CaCO_3$)	(su)	pH[e] (su)	NP/AP[a]	NCV[a] (ppt $CaCO_3$)	Final pH[d] (su)	Final pH[d] (su)	Final pH[c] (su)	Net Alkalinity[c] (mg/kg)	Final pH[f] (su)	Net Alkalinity[f] (mg/kg)
26	Genesis 1/3	Code 1			4.11	3	Acid producing	Acid producing	Acid producing	Acid producing		Acid producing		Acid producing
Waste rock	UCD	-1.85	-42.1	-33.4			0	-42.1	2.44	2.2	2.24	-11648.9	4.62	-3886
27	Genesis 1	Code 2			4.68	4.75	Uncertain	Uncertain	Acid producing	Acid producing		Acid producing		Not acid producing
Waste rock	UCD	-0.54	-12.4	-9.4			0.1	-12.4	3.25	3.3	2.81	-803.2	6.51	656
28	Bobcat	Code 1			6.24	6.38	Acid producing	Acid producing	Acid producing	Acid producing	Not tested	Not tested	Not tested	Not tested
Waste rock	US	-1.78	-40	-22.5			0	-40	2.41	2.01				
29	Bobcat	Code 3			7.01	8.01	Uncertain	Uncertain	Acid producing	Acid producing	Not tested	Not tested	Not tested	Not tested
Waste rock	US	-0.08	-1.7	13.3			0.8	-1.7	3.2	3.4				
30	Genesis 1	Code 1			6.1	6.48	Acid producing	Acid producing	Acid producing	Acid producing		Acid producing		Not acid producing
Waste rock	US	-1.75	-40	-10.3			0.1	-40	2.42	2.22	2.33	-3361.6	6.06	524
31	Genesis 1	Code 2			6.8	7.61	Uncertain	Uncertain	Acid producing	Acid producing		Acid producing		Not acid producing
Waste rock	US	-0.44	-10	8.5			0.6	-10	2.89	3.48	2.62	-1009.5	6.66	1101
32	Genesis 1	Code 2			7.44	8.04	Uncertain	Uncertain	Acid producing	Acid producing	Not tested	Not tested	Not tested	Not tested
Waste rock	US	-0.31	-7	30.9			0.7	-7	3.26	3.47				
33	Genesis 1	Code 4			7.51	8.14	Uncertain	Uncertain	Acid producing	Acid producing	Not tested	Not tested	Not tested	Not tested
Waste rock	US	0.16	3.7	15.3			1.1	3.7	3.25	3.39				

Table B-1-6. Summary of various static and kinetic testing results for the Genesis samples.

		Static Test Results							Kinetic Test Results					
		NCV Type			Paste pH	MWMP	ABA Class[a,c]		PAG	BAPP	Humidity Cell Class	Humidity Cell Class	Field Oxidation Class	Field Oxidation Class
Composite ID	Location/ Alteration Type	NCV value[a] (% CO_2)	NCV value[a] (ppt $CaCO_3$)	NNP value[b] (ppt $CaCO_3$)	(su)	pH[c] (su)	NP/AP[a]	NCV[a] (ppt $CaCO_3$)	Final pH[d] (su)	Final pH[d] (su)	Final pH[c] (su)	Net Alkalinity[c] (mg/kg)	Final pH[f] (su)	Net Alkalinity[f] (mg/kg)
34	Genesis 1	Code 5			6.99	7.53	Not potentially acid generating	Not potentially acid generating	Acid producing	Acid producing		Not acid producing		Not acid producing
Waste rock	US	2.41	55	19.7			3.2	55	3.32	3.43	6.66	181.3	6.36	1669
35	Genesis 3	Code 2			6.24	4.89	Uncertain	Uncertain	Acid producing	Acid producing	Not tested	Not tested	Not tested	Not tested
Waste rock	US	-0.71	-16	-3.2			0.2	-16	2.81	3.06				

[a]Newmont Metallurgical Services

[b]SVL Analytical Inc. (2007)

[c]McClelland Laboratories Inc.

[d]Little Bear Laboratories Inc.

[e]BLM (1996)

[f]Based on the field oxidation data during the 2.6 year test.

su = standard units.

ppt = parts per thousand.

When % sulfide and % carbonate values are less than detection limit, NP/AP is calculated using the detection limit.

Alteration types: OS (oxide siliceous), US (unoxidized siliceous), OC (oxide carbonate), OCD (oxide carbonate decalcified), UC (unoxidized carbonate), UCD (unoxidized carbonate decalcified).

Note: Composite 9 was omitted from analysis.

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______**2009b**. Total sulfur, total carbon. SVL 4097 version 4.0. Kellog, ID: SVL Analytical Inc.